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In a relatively short time, the web has become a rich source of streaming video and audio. Sometimes, though, you want to watch something later, when you might not have an internet connection. What do you do then? Well, you could use a downloading tool to rip them from the web. We've been looking at how this is done, as well as thinking about the limitations and the legal ramifications

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Against all odds, Microsoft's mobile operating system has actually managed to carve out a niche for itself. Yes, it's still lagging way behind iOS and Android, but a combination of affordable handsets and slick performance have helped to give it a not-insubstantial foothold in the market. For all of you carrying one of these devices around with you, Robert Leane has some handy tips

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As our weekly crowdfunding column shows, we rather like the idea of people clubbing together to get something interesting made. That said, we also know that it's not without its pitfalls and, like anything, there'll always be a few dishonest types who look to use it for nefarious means. What dangers lurk in the world of crowdfunding. and how do you avoid them? Sarah Dobbs has been looking for answers

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Technology often moves at an incredible pace, but the way we interacted with computers didn't really change for decades before touchscreen technology took off. Though mouse and keyboard are still going strong, it doesn't mean people aren't still looking for new forms of user interface, and Microsoft has more than a few ideas up its sleeve

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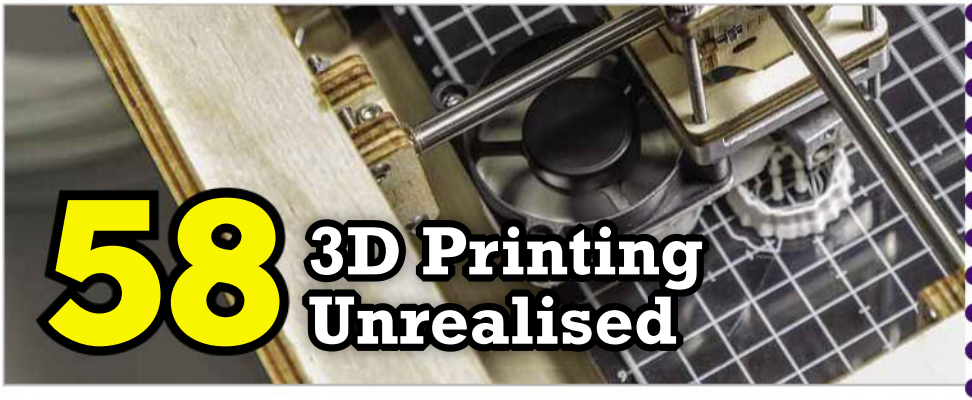

58 3D Printing Unrealised

46 Colour Laser Printers

Anyone who's worked in an office will be familiar with laser printers. They were big, bulky machines, and they cost an absolute ton. The idea of having one at home, particularly a colour model, was once ludicrous – but that's exactly where we are now, and they don't necessarily even cost that much. David Hayward has been testing six of them this week, looking not just at print quality and price, but also the running costs. Could one of them find a place in your home?

56 Raspberry Pi VPN

Thanks to the infamous revelations from Edward Snowden, we now know that governments spying on us isn't just paranoia. Bearing that in mind, you might be one of the many people who use a VPN to hide your location when online. But did you know you can set up a Raspberry Pi to do it for you, so all the PCs on your network can connect to a proxy, rather than just one of them? David Hayward shows us how it's done

60 3D Printing Unrealised

The 3D printing revolution hasn't happened. Harsh, but ultimately true. The question is, why hasn't taken off when it is undeniably one of the most interesting and potentially useful things to happen to consumer technology for quite some time? Well, as Mark Pickavance explains, it's down to a combination of different things, but that doesn't mean its time isn't coming…

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How To Rip Video And Audio From The Web

Seen or heard something you like online and want to keep it? **David Crookes** looks at the options

The word 'rip' is a curious one, and it's nearly always associated with something bad happening. If you rip a piece a paper, you destroy its previous form. If you're 'urban' and hip, then rip means you're dissing someone. People get 'ripped off' or they 'let rip' with smelly consequences. Bayern Munich manager Pep Guardiola ripped his expensive trousers (although he didn't seem too bothered). And if you RIP, then you're dead. It's just not good.

The same goes for ripping audio and video off the web. "The feature obviously needs legal disclaimers," said the boss upon commissioning this article. And that's because it is a very contentious subject. There is a belief that ripping stuff is inherently bad; that it rides roughshod over other people's intellectual property. The idea that you're not just downloading or extracting or saving but are 'ripping' something seems somewhat aggressive and wrong.

And in many circumstances it is. But then consumers have long had a strained relationship with entertainment media. Although we have access to more content than ever before, arguments over what we should be allowed to do with it once it comes into our view or hearing range have raged for decades.

Not too long ago, children would spend their Sunday evenings recording their pick of that week's Top 40 songs on the radio, trying to press pause just before the DJ started to talk. Today, that would be termed 'ripping'. People would produce romantic mix tapes and hand them to loved ones. 'Ripping and burning', we would argue. They would also think nothing of using a dual cassette deck to copy an album to a C90 blank (even though Amstrad, which made twin-tape decks mainstream, made clear in its adverts that copying was illegal).

In more recent times, music lovers have made copies of CDs for their car, and they have been ripping discs to iTunes and other MP3s account. Yet this was actually illegal until last October, when a new law made it lawful to copy CDs, DVDs and Blu-rays, provided they're for personal use. "These changes are going to bring our intellectual property laws into the 21st century," the minister for Intellectual Property, Baroness Neville-Rolfe, said. But many would argue that they haven't.

For those wanting to rip video and audio from the internet, the situation is very different. It may be legal to change a purchased TV, movie or e-book download from one format to another, but if you make a recording of streamed music or video from the likes of Spotify and Netflix, you may well find yourself on the wrong side of the law.

If nothing else, you will be falling foul of a service's terms and conditions. Netflix, for example, states, "You agree not to archive, download (other than through

caching necessary for personal use), reproduce, distribute, modify, display, perform, publish, license, create derivative works from, offer for sale, or use (except as explicitly authorised in these Terms of Use) content and information contained on or obtained from or through the Netflix service without express written permission from Netflix and its licensors."

Spotify expects users to respect IP, so it bans 'copying, reproducing, 'ripping', recording or making available to the public any part of the Spotify Services'. And there are clear reasons for this. Streaming services have a wealth of content, available to view or hear immediately. To rip these could be akin helping yourself to a bunch of DVDs and CDs in HMV.

But ripping is all about common sense. It's about making judgements over what is moral and keeping within legal guidelines. And it's about bearing in mind that if you make copies of something from the internet and share it or sell it, then you will be rightly brought to the attention of the authorities. Do it sporadically and for strict personal use, though, and you will, most likely, be left alone. When you rip, you should do so with the greatest of respect.

Why Rip Content?

With all of that in mind, let us first look at why you may want to rip content from the web. For some, ripping allows them to view content at a time and in a form that is more suitable. For example, someone may want to record a streamed programme because it's about to be pulled from a service that day and they don't have the time to watch it there and then. In their mind, it would no different in many ways to recording something off the television. Indeed the law for broadcasting states that recording something to watch or listen at a more convenient time is acceptable. If it was not, then the likes of Sky+ and TiVo would never have got off the ground.

"The Torch browser has a built-in media grabber that needs no extra software"

Ripping also lets you store useful prerecorded content, allowing it to be forever available to you should anything happened to a host website. You may come across something on YouTube that you like to like to refer every now and then, such as a tutorial showing a particular computing technique that you always struggle to grasp. Ripping it would keep that video close to hand, even if the poster decided to delete his or her account in the future. It would also make the content available offline – useful for those moments when you do not have access to an internet connection.

In terms of audio, you may discover a sound clip on a website that you want to keep hold of. Or there may be a show that you really want to listen to later that does not have a podcast option. Some people find they have uploaded their own audio creation to a website and accidentally deleted the original. Ripping could be the only way to create a new file.

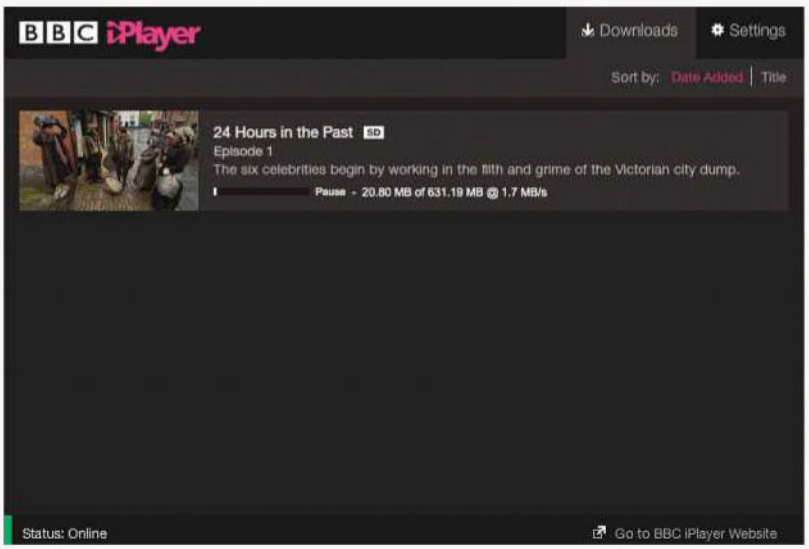
Downloading Videos

So how can you do it? In many cases, it may be as easy as using the Torch browser (**www.torchbrowser.com**), which has a built-in media grabber that needs no extra software, converters or extensions, and works with a single press of a button. There are also extensions for Chrome such as Chrome YouTube Downloader and Video Downloader Professional.

YouTube is very protective of its service, though. It takes a strong line against any copyrighted videos that are uploaded to the site, using a system called ContentID, which matches the audio and video of each upload against content provided by networks, record labels and film studios. If a video is found to be breaching copyright, it is usually removed (although the content owner can ask for a split of the advertising revenues instead).

It also discourages downloading. Nowhere on the site will you find a quick option to download any of its millions of videos for offline viewing. Indeed, YouTube is so against this kind of thing that it will seek to discover the most popular current methods of downloading its content and try to work out technological methods to prevent them from working.

One site that seems to have kept ahead of the curve is **KeepVid.com**. It allows users to input the URL of a YouTube, Facebook, Twitch.tv, Video or Dailymotion video and then click on a download link. The site gives you the



option of 3GP, FLV, MP4 and WEBM formats, and the whole service is browser based, so there are no apps to download. You just need to make sure you have Java runtime installed.

KeepVid may also work with videos you spot on the pages of websites that hide the URL of their files. URL Snooper (**tinyurl.com/mmsnooper1**) has been created to get around this problem. If you see a video you like but you can't work out where it is located, run this app and it will tell you. You can also use the VideoDownloadHelper extension for Firefox, which analyses web pages and tries to find relevant links.

If nothing else, you could use Any Video Recorder (**www.any-video-recorder.com**). It needs to be downloaded, and it only works on Windows PCs (there is no Mac or Linux version), but it allows you to record whatever is playing on the screen at that particular moment. This means you can not only rip YouTube videos but also those on other sites, including catch-up services. Some of its abilities are morally dubious, though. It can remove DRM from iTunes M4V movie rentals and purchases, and it can record rental HD videos and protected DVD movies, both of which we cannot recommend you do.

Capture Recorded Broadcasts

That said, if you want to download programmes from the likes of the ITV Player and many other catch-up services for later viewing, then Any Video Recorder would be your best bet. But you don't need external software for a good number of services: a fair few have download options built in.

Sky Go lets you download films to watch offline later if you are a

Download A YouTube Video

KeepVid is a web-based tool that creates downloadable links for YouTube videos.

Choose A Video

The first thing to do is actually find a video that you want to download. Open YouTube.com and browse the site until you come across a clip that you would like to retain.

Make A Note

Go to the URL bar of the page you're on and highlight the web address of the YouTube video. Then copy it. Make sure you copy the entire URL.

Launch KeepVid

Now go to keepvid.com. At the top of the screen is an input bar. Paste the URL from the second step into this and then click the Download button to the right.

Choose A Format

KeepVid will present the video for download in a variety of formats from MP4 and FLV to 3GP and WEBM. It's also possible to extract the audio by selecting Download MP3.

Watch The Video

The video will now be downloaded to your computer. You can then open it in a compatible video viewing package and play it back.

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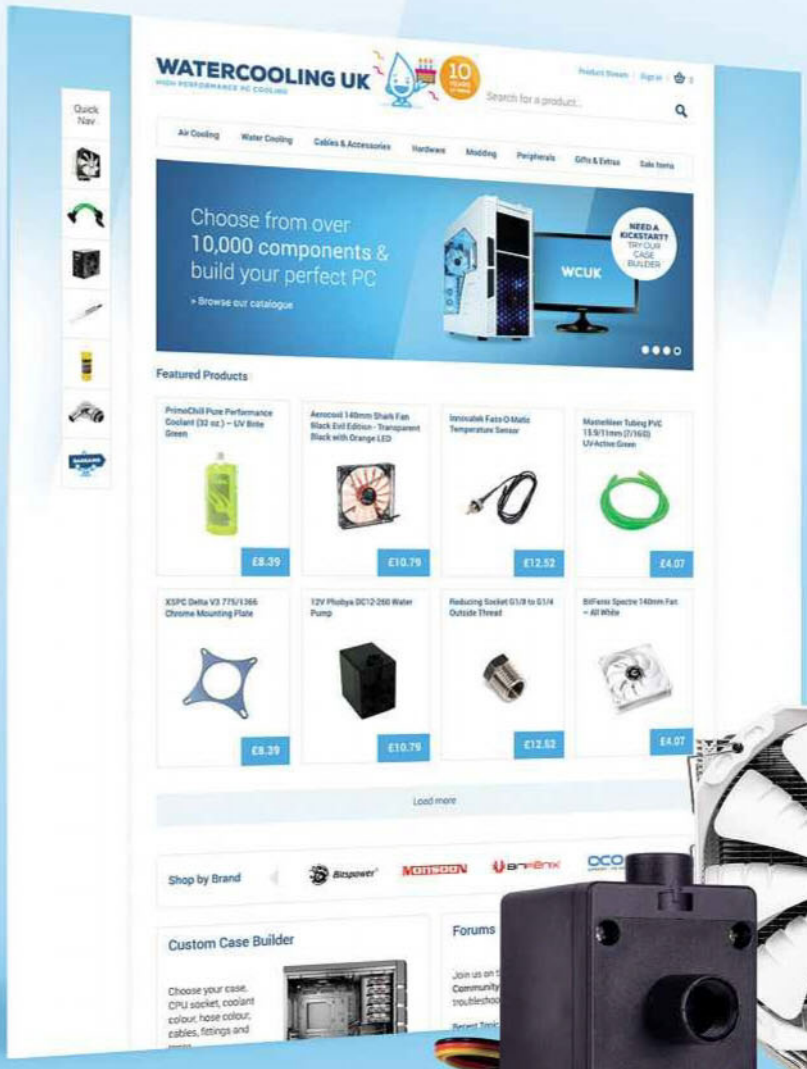

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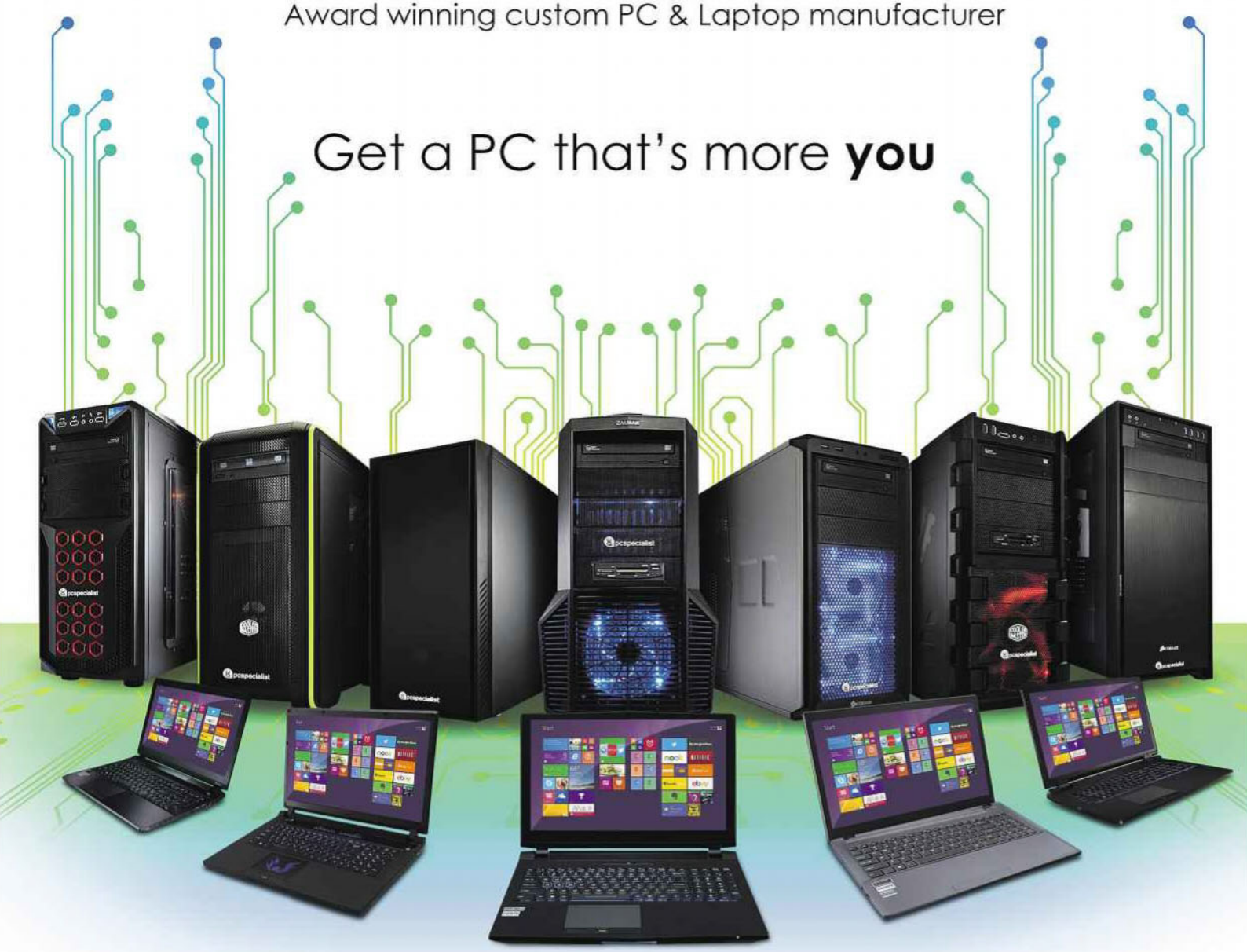

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> **PopCatcher patented software that could distinguish between music, speech and advertisements on a radio station**

subscriber, and Demand 5, Channel 5's offering, has its own paid-for download function, with costs ranging from just 99p to £1.99. The shows are stored for 14 days and they can be watched as many times as you want over 48 hours. We would always recommend you pay if the option is available.

If you want to stock up on some free content, though, the BBC iPlayer and Channel 4's 4oD are perfect choices. Most of their shows can be downloaded and stored for 30 days, which gives you plenty of time to watch. After that period, the programmes are deleted. For that reason, you don't necessarily need any third-party recording software, and it's a shrewd and helpful move by these broadcasters.

For it to work, you need to install BBC iPlayer Downloads (**www.bbc.co.uk/iplayer/install**). When you see a programme you like, select Downloads and choose between Standard or High Definition. The download option on the BBC iPlayer is also available for many devices including tablets, and the Xbox 360 was added on 17th March this year. The BBC is working to bring the same 30-day feature to BT Vision and Virgin HD.

Record Live Broadcasts

There are times, though, when you want to capture live broadcasts. This can tricky, because there is no source file to obtain and, as each frame is played, you're unable to go back and recapture. It's lost forever in the digital sky, so you have to grab the live stream as and when it's being broadcast. On top of that, you need to find a way of getting a live channel on your desktop in the first place. Thankfully, that part is a little more straightforward.

You could do worse than try TVPlayer (**tvplayer.com**), which broadcasts live Freeview channels including the Food Network and Cbeebies. You should also try Filmon.com. This also has a host of live television from the UK and beyond, covering free-to-air channels such as the BBC, ITV, Dave, Yesterday, CBS Drama, 5*, 5USA and Pick. There are also lots of video-on-demand programmes and user-generated content.

With Film.com's downloadable desktop app, you can record these channels, but it comes at a cost. Three hours will set you back £5/month, going up to 300 hours for £190/year. You also have to pay if you want to watch in HD (this gives you ten hours recording space, though). For the ease of use and a simple way of ripping live TV, you may feel that's worth the cost.

That said, there are alternatives, and these also work with TVPlayer. StreamTransport asks you to enter the URL of a web page, and it automatically detects a stream. When you select it and click Download, a file is created and the video is captured live. You have to keep an eye on it, so you can stop it when it's finished, but it's very powerful and should capture most of what you throw at it.

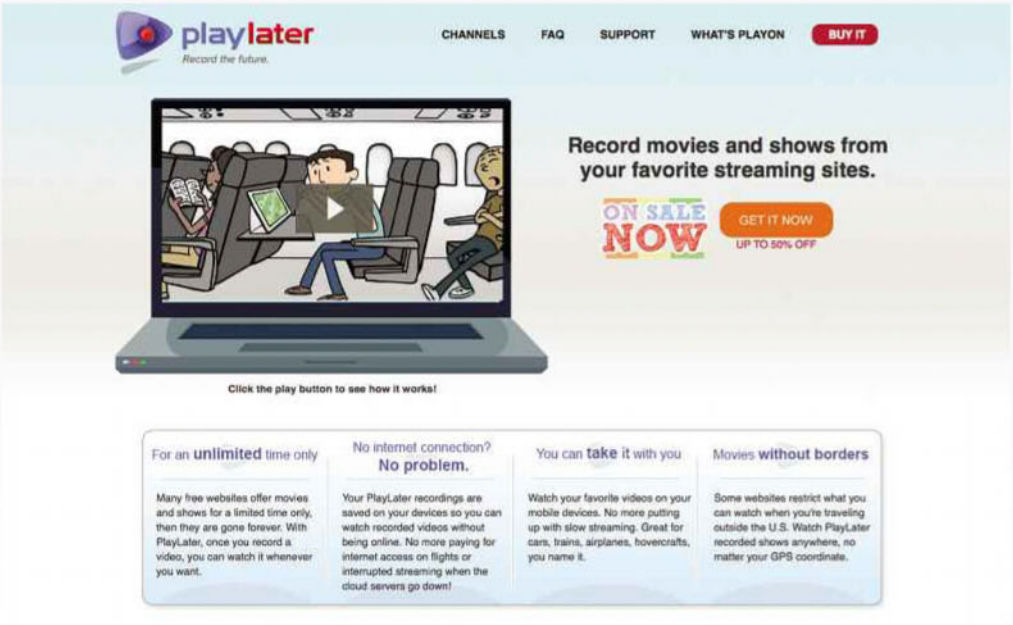
Download All Of Netflix At Once

A service called PlayLater has been around for a few years, billing itself as the first DVR for online video and letting users record movies and shows from streaming websites. It claims its service allows the viewing of content on the go, when there's no internet connection available, and it says it gets around the problem of servers going down mid-programme (something that is not much of a problem these days).

It costs $24.99 a year or $49.99 for a lifetime, and it's only available in the US but some people have already raised some dodgy uses for it, such as being able to take out a one-month subscription to Netflix and then downloading everything you could ever want during that time – as long as you have the storage space on your computer, anyway.

PlayLater insists that its service is legal. "PlayLater is technology designed to let individuals watch legal online content whenever and wherever they like," it says. "Just like the broadcast DVR and the VCR before it, PlayLater is designed for personal use and convenience." But, as always, the legalities depend on how people use it, and downloading Netflix in bulk would not be advisable.

Screencastify is also a good choice. Made to operate within Chrome, Chromebooks and Chromeboxes, it allows you to open up a browser window, press record and grab whatever rolls on screen from that point. It saves the footage to your computer, but it can also store footage on Google Drive. This means your recordings can be viewed on a wide variety of devices,



but do be careful when uploading copyrighted material to a service like that.

Certainly Screencastify's primary aim is to allow you to create video tutorials and to record presentations (you can add a webcam and connect a microphone), even though its use extends well beyond that. The free version limits you to just ten minutes, and to get unlimited recordings, you have to pay €20 (around £14). It's a small price to pay for such a professional, wide-ranging app, though.

Two other apps to consider are CamStudio and Movavi Screen Capture Studio. CamStudio is free and open source, and designed for the same purposes as Screencastify: demoing software, producing tutorials and recording on-screen glitches that you may want to show to a computer repair person. It also provides AVI video files that can be turned into streaming Flash videos. Movavi Screen Capture Studio lets you capture streaming video, Skype calls, video guides and more, while providing editing tools so you can even enhance the footage you have ripped so it best suits your need. You can select the screen area you wish to capture and the frame-rate.

Ripping Audio

Ripping audio is perhaps more straightforward than video, because you only have to grab one kind of media. KeepVid.com is worth considering if you need to extract audio from YouTube videos. As we have seen, it has a built-in option to do this, making the whole process very easy.

If you want to record tracks from other sources, though, then the best around is Apowersoft Free Online Audio Recorder. It can record the sound coming from your system with a single click, allowing you to record music, radio and audiobooks. It can also record Skype calls, and there is no limit to the length of the audio you rip. Apowersoft even makes it possible to create a scheduled task, so you could leave a radio station running and ask the app to record at a certain time. Do bear in mind that if you open anything else up when it is recording and it makes a noise, that will also be ripped.

Replay Media Catcher 6 works on similar lines (**applian.com/replay-media-catcher**). As well as being able to capture video and convert the media to more than 130 device and file formats, it lets you record and convert audio from any website or source at high quality. It even tags recorded MP3 music files using what it calls smart MP3 naming. Files can be copied to a phone or tablet, and it integrates with iTunes, Dropbox, Google Drive and SkyDrive. You have to pay for it (the Capture Suite costs £49), but there is a month-long trial to be had.

Things can get legally murky, though. In 2002, a Swedish audio research company called PopCatcher patented software that could distinguish between music, speech and advertisements on a radio station. It was released in 2007, allowing people to do what the kids did when taping the Top 40 all of those years ago: remove the songs and leave the chatter and clutter behind. As new music played on the radio, PopCatcher grabbed them. It called it "curation by radio station", and an app on Google Play was released. It was later pulled, and it is not currently available.

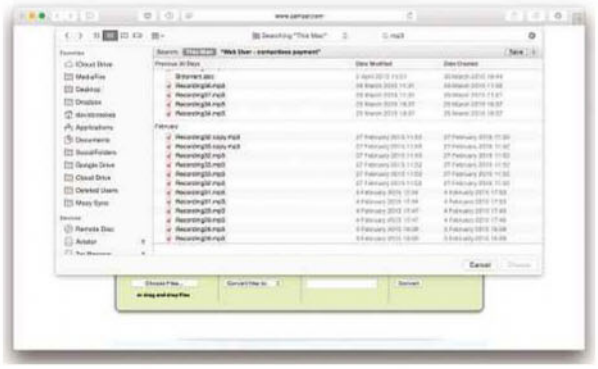
Another app that still exists, Radiotracker, lets you make individual song recordings from any internet radio station, pulling from a database of 90,000 channels. It boasts

Converting Files: How To Ensure Your Files Work For You

If you're ripping content from the web, you may find that it's not in the format you were hoping for. If this is the case, then one solution is to head for **Zamzar.com**, a free online file converter.

Launch Website

Go to **Zamzar.com**. You're able to covert files without downloading any software, and if there's a file you can't convert, you ask its engineers to take a look.



Find A File

Click on Choose Files and select the source from your hard drive. Zamzar.com can handle more than 1,200 file types.

Select A Format

Now you need to tell Zamzar.com which format you would like to convert your files to. Choose from the drop-down list.

Email Address

Input your email address and click Convert. Zamzar.com will process your file and give you a time estimate. When it's finished, a link to the file will be emailed to you for download.

recording edited to the millisecond, and it has a timer for time-controlled radio recordings.

Even so, these kinds of apps are not necessarily needed given that the likes of Spotify exist. There are lots of apps that allow you to rip tunes from Spotify online, but to do so is blatant piracy. For this reason, many of them end up disappearing, including Downloadify which was a Chrome extension that let people permanently download songs available on the streaming music service.

Although ripping the songs means you're able to listen to them on the go without having to find an internet connection, this function actually exists within Spotify, albeit for a fee. Spotify Premium lets you listen to your playlists offline for £9.99-a-month while stripping away the ads and offering high-definition sound quality. The ripping of audio, then, should really be focused on the music and sounds that would otherwise be hard to obtain, so long as you subsequently use them appropriately.

Get Ripping

And that's the thing with ripping audio and video. If it is done responsibly and for your own use, then there should be very few issues, legally and morally. Ripping can make life easier, and it can get you content that may not be available later. By ripping something live, for instance, you can guarantee to be able to refer back to it without having to wait for the content creator to make it available for download as a podcast (if indeed he or she does that at all).

Similarly, by ripping something prerecorded that you have struggled to find through normal download channels, you can make it work better for you. Being able to put content on your phone so you can watch it offline, or being able to store it on your hard drive so you will be able to view or hear it months after it has been withdrawn can be very useful. But, as we have stated all along, you need to make those judgement calls and adhere to the law. Ripping is only seen as a naughty word because some people do very naughty things with it. **mm**

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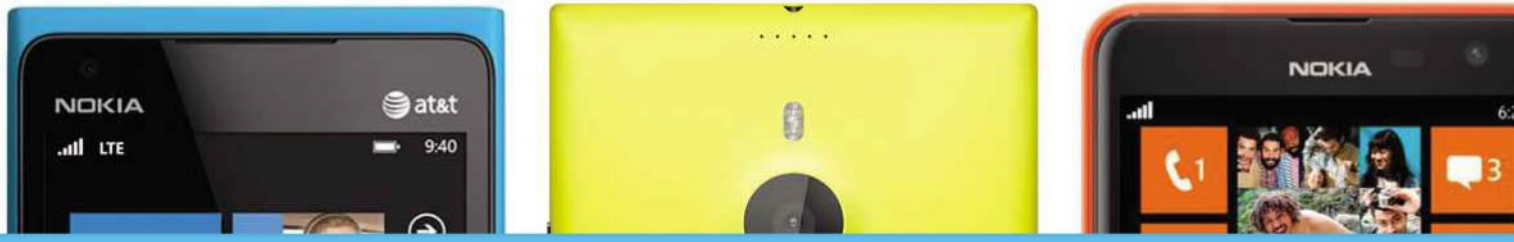


Getting The Most Out Of Your WINDOWS PHONE

Rob Leane delves into the depths of Windows Phone's Store to find the best saving graces available on the troubled system

At some point in the recent past you may have been tempted to sign-up for a Windows Phone. Those colourful squares look awfully snazzy, after all. "Oh, by the way, it's cheaper if you get a 24-month contract," the shop clerk might have nonchalantly mentioned as well. Naturally, being as cash-savvy as you are, that bargain of an offer was probably snapped up within a matter of minutes. Maybe you even signed up for some insurance and additional benefits, too. What a good day it was shaping up to be, with all your mobile telephone problems solved in one fell financial swoop.

Then, you got home and switched the thing on. After a few minutes spent revelling in the multi-coloured glory of your new OS, you probably realised something: that cool app (the one you used on your old iPhone/Android) or the trendy new game everyone is talking about isn't available on your shiny new Windows device you were so happy about a few minutes ago.

Over the ensuing weeks and months, you probably found this a lot. Occasionally there would be an advantage (*Flappy Bird* stayed on Windows Phone in its original form for longer than it did on iPhone, for example), but for the most part your supposedly futuristic and fancy phone may have seemed to be lagging behind in the race to provide the coolest downloadable content.

There are some saving graces to be found on Windows Phone that can alleviate many of the initial problems you found, though. There are some handy alternatives to absent apps that you may be missing – and even some rare exclusive treats to be had to make your iOS/Android toting friends envious – so make sure you're getting the most out of Windows Phone by heeding these tips.

Access Gmail Through Alternative Apps

One of the first things you'll probably notice on Windows Phone is that there is no official Gmail app. Given that Google's email service has over 4.2 million users worldwide, this has proven an immediate problem for many owners. The solution here is a simple one, though: you just have to launch the standard-issue Email app that should come preinstalled on your system, and follow the simple instructions to link it to your Gmail account.

It may not have the white-and-red Google imagery you've become accustomed to, but you will be able to access, send and receive emails through your Gmail account within a few minutes of synchronising. If you're willing to pay, you can get yourself a closer to the usual Google experience by grabbing an unofficial Gmail app. That will cost you 79p, but offer the closest likeness to the real thing. Either way, not being able to access your Google emails shouldn't hold you back for long.

Organise Your Life With Due

On the Apple side, iCal is a widely successful organisational tool that lets you link your calendar between devices and share appointments with friends, too. The Calendar app on Windows Phone is a sorry alternative, though, meaning that – if you're the type who uses their devices to keep their work schedule in check – you'll need to find an alternative.

While there's an immeasurable amount of calendar apps to use in lieu of iCal (check out Simple Calendar for that), the to-do list app Due is arguably the most user-friendly organisational app to be developed for Windows Phone.

By splitting your work life into the three simple categories of 'do it today,' 'do it tomorrow' and 'do it someday,' Due can help you simplify the working

week into a more achievable-looking list of tasks. If you really want to stay in the zone, you can even set Due to dominate your lock screen, meaning that you'll be met with a brief reminder of the task in hand every time you reach for your phone instead of working.

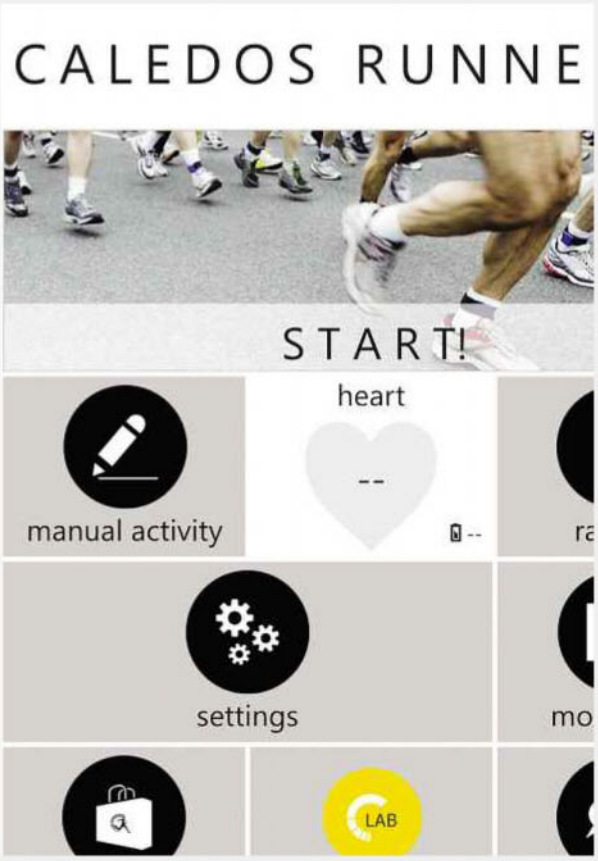
Get Fit With Caledos Runner

One term you ought to get used to when getting the most out of your Windows Phone is 'third party client,' meaning an app that connects you to a bigger name service. In this case, Caledos Runner is the Windows Phone enabler of RunKeeper, the immensely popular exercising app that has been available on Android and iOS for years.

RunKeeper never made it to Windows Phone, though, so Caledos LAB made their own version, fully synchronise-able with the original and linkable to social media sites as well.

This can connect you to a friendly network of fellow exercisers comprised of your Facebook friends (some of them are almost certainly using RunKeeper already) where you can track your fitness progress, comment on each other's running routes and generally share the difficulty of getting into a fitness routine.

Caledos Runner doesn't feel like a knock-off or an imitation, it feels like a slick and easy-to-use app that makes keeping track of calories burned, distance travelled and personal improvements brilliantly easy across running, cycling, walking and more using GPS and a clever system of analysis.



Stay Connected Via Social Media Stand-Ins

Pinterest and Instagram are two massively popular social media sites, which makes their omission from the Windows Phone Store particularly surprising. You needn't fear, though, because some developers have provided third-party get-ins to keep you connected.

For Pinterest, try PinIt, which allows access to the whole social platform and enables the full service of sharing your favourite images to continue. For Instagram, the photography-focused site, Instance is probably the best stand-in.

If you music is your thing, the lack of a proper Souncloud app might be a bit of a pain, too. There have been third-party attempts at getting around this (with Audiocloud being the highest profile alternative), but in this case we'd actually recommend the Soundcloud mobile site.

It's surprisingly rare these days to find a mobile site that feels as slick and user-friendly as the desktop equivalent, but Soundcloud manages it with flair. Their site is easy to navigate, quick to load and nice to look at, too.

Providing you have a wi-fi connection (or a hefty data package), you could be listening to your 'jam' within seconds of typing into the search bar. On the homepage, you can pick up recommendations from your friends and contacts too, meaning that your Windows Phone might just be the place you discover your new favourite artist.

Control A Galaxy Far, Far Away

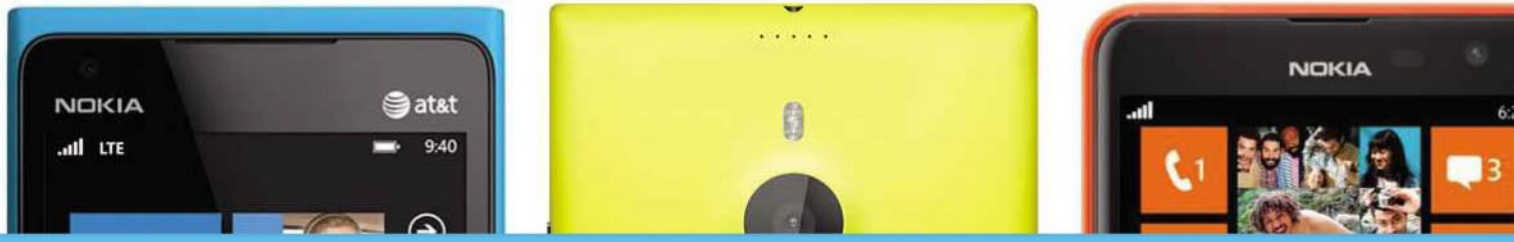
Gaming isn't always the easiest passtime on Windows Phone, where official versions often take an age to arrive, and sometimes don't arrive at all. Although a link to the Microsoft's Xbox accounts is a nice touch for some, gaming is generally a bit underwhelming for Windows Phone users.

Star Wars: Tiny Death Star is a treat, then – a game that is now only available to new customers via the Windows Store (Disney have pulled it from the App Store and Google Play) and is good for hours of enjoyment. It was developed by Disney Mobile and NimbleBit, and is modelled on the latter's previous game, *Tiny Tower*. *Tiny Death Star* is essentially a simplified Sims game for *Star Wars* fans, pitting the player as a miniature Darth Vader tasked with filling the Death Star with apartments, businessmen and VIPs to make money for the evil Empire. It's silly, funny and definitely worth checking out.

Play Along With SongArc

Additionally, one of the biggest achievements in Windows Phone gaming is *SongArc*, which was originally developed as a Windows-only offering. Now, though, it is available on iOS and Android and has been downloaded 1.6 million times.

The crux of the game is simple – play along to your favourite songs. Like a *Guitar Hero* game aimed solely at your thumbs, you can use your own music collection as



the backing track to a button-bashing melody-matching challenge that will keep you playing for hours.

It's a game that you will pick up the basics of quickly, but the elusiveness of a perfect score will make *SongArc* truly addictive for even the most hardened gamer. As a nice touch, independent musicians have submitted songs, too, meaning you might just find a new favourite tune during your next gaming session.

Grab Documents With Office Lens

Suitable for spies, students and anyone else who might get a glimpse of a document or presentation that they'd quite like to keep, Office Lens is a Microsoft original app that had such success on Windows Phone that it has now been rolled out on iOS and Android as well.

Office Lens is essentially the more realistic alternative to carrying around a document scanner in your trouser pocket. By combining your Windows Phone's camera with an intricate text-reading software, this app allows you to take a snap of a document, presentation, business card, receipt or written text and zap it straight into your phone.

Couple use of this app with the official Dropbox app, or simply email yourself the files, and you can get a print out from your desk into your desktop PC in no time at all. It's an ideal tool for people who sit in a lot of meetings, attend networking events or travel a lot for work.

Get Around With Gmaps

As with Calendar, the built-in Maps app on Windows Phone leaves a lot to be desired. There are plenty of alternative navigation maps on the market, with an easy favourite being the user-friendly Gmaps.

Gmaps – which is free to download, with a few unobtrusive ads – utilises data from Google Maps to offer handy features like finding your location, giving directions and even search the local area, which comes in handy if your designated driver is low on petrol or you're struggling to find a restaurant.

You'll find Ultimate Street View handy for getting around as well, and when you've got the Driver Mode turned on your phone can effectively stand in for a sat-nav, too. If the ads annoy you, you can pay a small fee to get rid of them.

Save The Universe In Halo

The *Halo* series is the crowning glory of Microsoft's gaming achievements, so it's no surprise that the launch of their own mobile system was quickly followed by a hand-held downloadable version. The resultant game was *Halo: Spartan Assault*, which made its Windows Phone debut back in 2013.

It's still great fun now, even for those who are unfamiliar with the console franchise. It's effectively a sci-fi-themed top-down shooter, which you control through 'virtual joysticks' by poking your thumbs in the right direction on screen.

There's a free trial version if you're not convinced, which we're sure will impress. For a phone game, it pushes the limits of graphics more so than the majority of offerings and provides an action-packed sci-fi story to liven up the morning commute, too. **mm**

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The Dangers Of Crowdfunding

It's never been easier to attract investors for a new business idea – nor to support pioneering new start-ups. But is there a darker side to crowdfunding? **Sarah** examines the pitfalls…

Crowdfunding sites like Kickstarter can be a brilliant thing. They allow people with ideas to connect with the people who might want their project – and who are willing to chuck in the money to turn those ideas into reality. There are plenty of success stories of the back of a popular Kickstarter or IndieGoGo campaign, and plenty of happy customers who got to watch the film they funded or get early adopter access to a new gadget they helped to get developed.

But let's be honest, there are times when things go horribly wrong with crowdfunding campaigns too. Removing the gatekeepers from industries like tech and arts might seem like a good idea that allows brilliant people the freedom to do what they want, but it also allows less savoury types to take advantage of the kindness of strangers. Crowdfunding sites do their best to make sure everything runs smoothly and everyone does what they say they're going to, but there's still no guarantee that your money is going towards the thing you've paid for. Let's look at some examples of how things can go wrong…

Scams, Scams, Scams

The most obvious issue with pledging money to a Kickstarter-type project is that you don't really know who the person on the other side is or what they're up to. Take the recent example of the MotivBand.

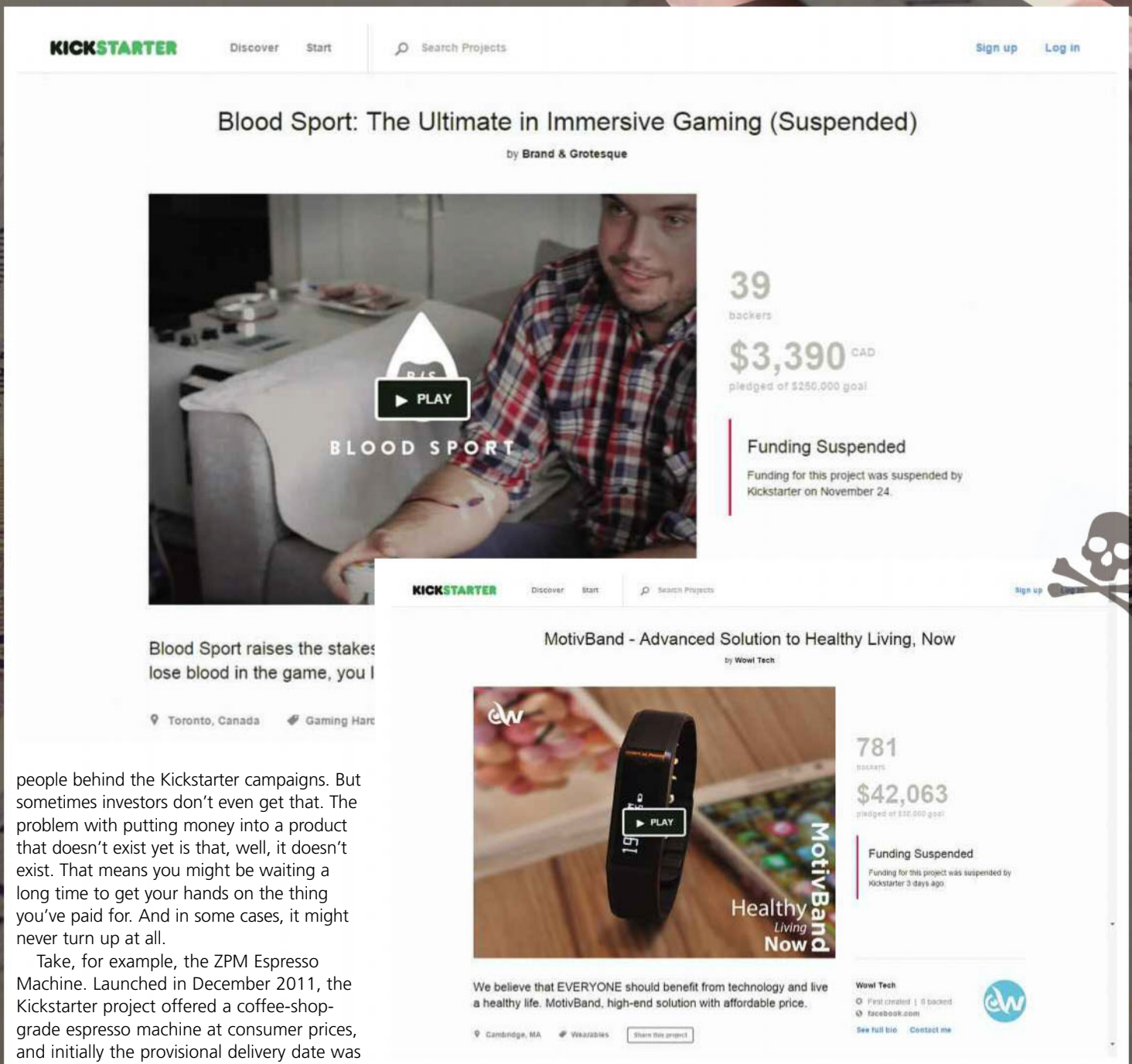
According to the project page, the MotivBand was similar to the FitBit or any number of other smartbands: it tracked exercise and sleep, issued alerts when the wearer wasn't moving enough, and also connected to a smartphone to take calls and messages. The selling point? Backers could get one for just a $35 pledge, which is pretty cheap for a band of its type.

Not cheap enough, though, since it turns out the MotivBand wasn't a new, innovative product at all – it was just a repackaging of an existing band, available in bulk from Chinese sellers for around $28 a pop. If you read the project page carefully, it never actually says that the product is in development or that it needs Kickstarter money to get off the ground, but it's pretty clear that this kind of reselling isn't in the spirit of Kickstarter. And Kickstarter's staff clearly agreed, because when they were alerted to the issue, the project page was suspended – and $40,000 worth of pledges were cancelled.

This isn't the first time this has happened either; in 2013 a Kickstarter page was created for the Rock smartwatch, which turned out to be a repackaged (and more expensive) version of a watch already on the market. Now, obviously buying in goods and reselling them for a profit is basically how most shops work, but Kickstarter isn't a marketplace; it's for funding projects that might not otherwise get investors. This kind of thing is just about tricking people into thinking they're supporting something new and getting an early bargain – no one would be happy to find out the thing they'd 'kickstarted' had been available on eBay for years.

Undeliverables

As crappy as repackaging scams are, though, at least investors would have got something for their money; the products exist, even if they're not been recently developed by the



people behind the Kickstarter campaigns. But sometimes investors don't even get that. The problem with putting money into a product that doesn't exist yet is that, well, it doesn't exist. That means you might be waiting a long time to get your hands on the thing you've paid for. And in some cases, it might never turn up at all.

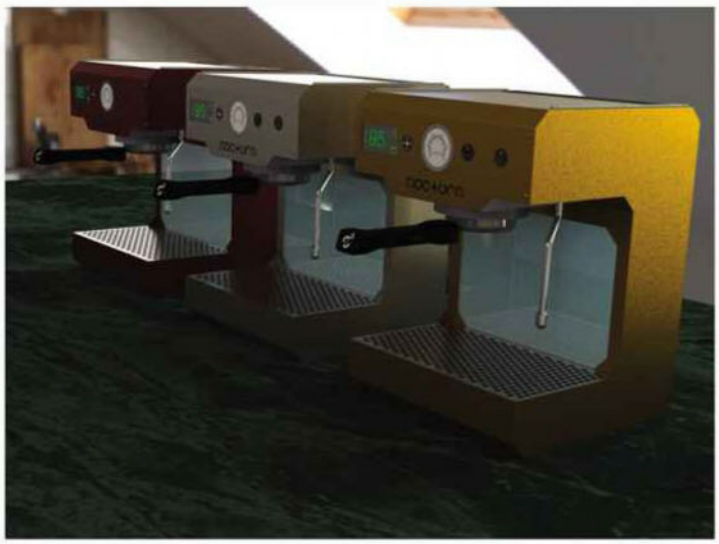
Take, for example, the ZPM Espresso Machine. Launched in December 2011, the Kickstarter project offered a coffee-shop-grade espresso machine at consumer prices, and initially the provisional delivery date was set for December 2012. In order to get one of the machines, you'd need to pledge at least $200 – which more than 1,300 people did, with ten people even pledging $1,000. Unfortunately, that amount of demand turned out to be more of a blessing than a curse, overwhelming the creators. The most recent update from the project is from last month, and still the machines weren't ready to ship to customers. Yikes.

A similar problem hit the creators of the Kreyos smartwatch, who raised a whopping $1.5 million on a goal of $100,000. Their manufacturing partners let them down, and while a few watches did make it onto the wrists of backers, they were faulty, leading unhappy customers to demand refunds. What had initially looked like a massive success had turned into an expensive (and humiliating) failure. There's a lesson there for potential Kickstarter creators as well as backers; it's important to know how things are going to work if your project succeeds, and make sure the amount of money you're asking for is reasonable, even if demand turns out to be huge.

Some Ideas Just Shouldn't Be Funded

The projects we've talked about so far, whether or not they ended up producing products, have at least been for fairly sensible ideas. But some Kickstarter and IndieGoGo projects should have been stopped before anyone donated even a dollar. You probably heard about the guy who created a Kickstarter project to raise $10 for a potato salad and ended up with over $55,000 to throw a massive potato salad party? That was one of the more harmless ideas.

Last November, Kickstarter suspended a project to develop a gaming peripheral that would draw blood from a player every time their character got shot in a game. Basically it tapped into the rumble function on a game controller, so as well as getting tangible



How To Report A Dodgy Project

Kickstarter has three rules for prospective projects:

- *Projects must create something to share with others.*
- *Projects must be honest and clearly presented.*
- *Projects can't fundraise for charity, offer financial incentives or involve prohibited items.*

So what can you do if you spot something that breaks one of those rules and looks like a scam? Scroll to the bottom of the page and you'll see a 'Report this project to Kickstarter' button. Hit that and fill in the form, and Kickstarter's Integrity team will investigate. If they agree that something suspicious is going on, the project will be suspended, and no money will change hands.

IndieGoGo has different rules for what is and isn't allowed, but there are similar 'Let us know' links on every campaign page that you can use if something's looking less than above board.

feedback that their character was in danger, they'd also lose actual blood that would be pumped into a special collection unit.

It's a terrifying idea, but at least it wasn't designed for home systems – according to the creators, it was intended to be used at blood donation drives, to encourage people to give blood. And there would have been safety features built in to make sure being rubbish at *Call Of Duty* didn't cause any actual fatalities. Blood Sport raised more than $3,000 in pledges before Kickstarter decided it wasn't a good idea and suspended the project.

There are plenty of other distasteful ideas asking for your dosh, from sexist books to horrifying games about rape, but those don't tend to get shut down. (Gratifyingly, most of them tend not to reach their funding goals, though.) There aren't rules about not being an awful person before you set up a crowdfunding project, but it is just another way in which crowdfunded ideas tend to differ from conventionally funded products: there's no legal or human resources department on hand to point out when something is a terrible idea.

Put Your Money Where Your Brain Is

At the end of the day, then, the best advice for prospective Kickstarter or IndieGoGo backers is to engage brain before handing over any money. Just as you wouldn't enter your credit card details on a dodgy-looking website selling vaguely described products without any real description or proper images, you should always consider whether the thing you're backing sounds legit. Stick the creators' names into Google search and see what their background is. Do they sound like the kind of person likely to be able to create the product they're asking you to invest in? Or have they been associated with scams in the past?

Massively overfunded projects tend not to be a great prospect either, because while someone might be able to build 20 gadgets in a garage, putting together 20,000 of them will require more resources (and time).

Lastly, it sounds awful, but consider whether you can afford to lose the money you're pledging. If you're chucking in £10 for a band you like to record an album, it probably won't be the end of the world if it takes two years to turn up – but paying $1,000 for a coffee machine you might never get to make an espresso with is really going to sting. **mm**

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MICROSOFT RESEARCH:

Natural User Interfaces

David Briddock looks at what new forms of interaction are coming

In this series we're uncovering some of the most interesting and innovative technology projects from Microsoft Research lab teams across the globe.

This time it's all about Microsoft's vision of how we'll interact with our everyday and personal computing devices in future.

A Motion Sensing Keyboard

Despite the widespread introduction and acceptance of touch-screen devices, gesture interfaces, handwriting recognition and speech input systems, the humble keyboard remains an essential input peripheral.

With this fact in mind, the Type-Hover-Swipe project (**goo.gl/v5rwjp**) team looked at how the keyboard might be augmented to enhance its input capabilities. Their prototype takes an otherwise standard keyboard and integrates a matrix of low-resolution infrared (IR) proximity sensors, neatly interspersed between the keys.

With this low-cost, easy-to-manufacture setup, it's possible to sense and capture hand motion – both on top of the keyboard's keys and directly above them. The captured motion data is analysed by a software application to identify matches against a pre-defined set of expressive gestures.

Later, the team further refined the prototype system by employing a machine learning algorithm as a motion data classifier. Once trained, this enhanced prototype could dynamically recognise movement in real-time and so extend its capabilities beyond the original predefined gesture list.

Early results are promising. When assessed over A large motion gesture set, they've achieved a motion gesture classification accuracy as high as 90%. And by using qualitative feedback from user trials, the team hope to further improve the system's robustness, while also identifying new research topics.

Enhancing The Digital Stylus

The resurgence of the digital stylus has been one of the human computer interface (HCI) surprises over the last few years, but one particular Microsoft Research team wants to take stylus interaction to a new level.

This team wants to exploit the different ways a user might grip and handle a stylus. In this way they hope to open up novel yet naturalistic ways to utilise hand contact and gesture interaction, and so deliver an altogether smarter way to interact with our tablets and other touchscreen devices.

The system is implemented as a combined hardware/software solution – one that enables the host system to distinguish which hand is holding the stylus and also determine if the stylus is being held in a writing grip or simply tucked away between their fingers.,This means common gestures (like drag and pinch) can be translated into different actions depending on which hand is used or how the stylus is held.

One real-world example would be an ability to ignore unintentional touch inputs while writing with the stylus hand. Meanwhile, a similar movement of the non-stylus-holding hand might cause a contextual menu to pop up.

Or take a painting app. The active tool could be switched from a pen to, say, a pallet knife when the stylus orientation is changed with respect to the screen surface.

Importantly, each individual application could define its own specific set of enhanced gesture interactions, so a

> **“This team want to exploit the different ways a user might grip and handle a stylus”**

video editing app could translate the same gestures quite differently from an app like Microsoft's OneNote.

One interesting notion is that an accurate grip sensing software algorithm could determine if the stylus is being used by someone else and evoke a privacy/security clamp down accordingly.

Of course, this is just scratching the surface of what's possible. The team believes the potential uses for this kind of advanced stylus technology are virtually unlimited.

And who knows?: Microsoft's upcoming Surface Pro 4 could have an enhanced stylus that incorporates some aspects of this team's work.

Touchless Interaction

Microsoft's Kinect product (which was also born in a Microsoft Research lab) enables game players to interact in a revolutionary full-body manner. But the potential of in-the-air gestures stretches much further than just the entertainment domain.

In a collaboration with Lancaster University, Addenbrooke's Hospital in Cambridge, King's College London, and Guys and St Thomas' Hospital in London, researchers are applying Kinect-style interaction to surgical operations.

Many surgeons already rely on in-theatre digital medical images, both as a medial reference and as a navigation aid. However, maintaining a boundary between the sterile and the non-sterile is critical, so any keyboard and mouse interaction is ruled out.

To help a Microsoft Research team developed a prototype touchless system where a surgeon can pan, zoom, mark, rotate and fade an image with either one or two hands. Such a system delivers interaction at a distance, allowing surgeons to spatially orientate themselves with respect to the various theatre displays without being distracted from the task at hand.

The same team are already working on integrating 3D image display and manipulation technologies with the same touchless system, and they might be collaborating with the team responsible for the holographic projection technology, as showcased in January's Windows 10 event.

"A key Windows 10 feature is the Cortana Notebook"

Speech Recognition With Cortana

The perfect personal assistant is always available, anticipates our requests and works unobtrusively. Cortana, the new Bing-powered digital assistant, could become that ideal personal assistant. At least that's what Microsoft Research engineer Larry Heck believes.

While it's easy to categorise this technology under the artificial intelligence (AI) banner, Heck is quick to point out the diverse research areas involved in personal assistant development. As Heck says, "The base technologies for a virtual personal assistant include speech recognition, semantic/natural language processing, dialogue modelling between human and machines, and spoken-language generation. Each area has in it a number of research problems that Microsoft Research has addressed over the years. In fact, we've pioneered efforts in each of those areas."

Cortana's Roots

Heck's own background includes his pre-Microsoft deep-learning and deep-neural-network technology work at SRI International during the 1990s. This led to the cognitive assistant CALO AI project funded by the US government's Defense Advanced Research Projects Agency (DARPA). Later roles at Nuance Communications and Yahoo further bolstered his research credentials.

Cortana's roots can be traced as far back as 2009, when Heck started the conversational-understanding (CU) personal-assistant project. Today, the project's scope is considerably wider, with long-term team goals focused on delivering the next-generation personal-assistant technology.

At Cortana's core are state-of-the-art machine-learning and data-mining algorithms. Developers and researchers have access to Microsoft's broad knowledge of these fields, including strong ties to the Bing web search group and Microsoft speech algorithms technology.

Speech and natural language processing are long-standing research areas, as is machine learning, while today Microsoft Research is known as one of the world leaders in deep-learning and deep-neural-network research.

And Microsoft Research has a long established association with AI, involving leading scientists and AI pioneers, such as Eric Horvitz with his decades-long research into conversational interactions and understanding. Other Cortana contributors include senior researchers Dilek Hakkani-Tür and Gokhan Tur, principal researcher Andreas Stolcke, software developer Madhu Chinthakunta and user-experience designer Lisa Stifelman.

> **“Cortana provides feedback through a visual set of emotional states”**

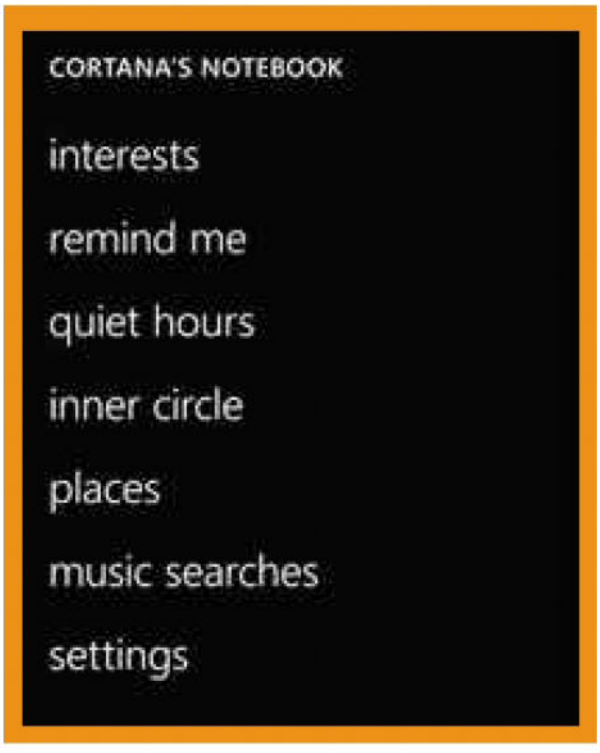
Making Cortana Smarter

Today, Cortana offers much more than simple voice-activated commands. Cortana is able to continually learn about its user. Consequently, over time, the assistance on offer becomes increasingly personalised, with the aim of proactively performing the right tasks at the right time.

For example, if asked to relate the outside temperatures every afternoon just before leaving the office, Cortana asks the user if they'd like to be automatically shown that information at that time from now on.

Given the appropriate permissions, Cortana can read calendars, contacts and email to glean knowledge of context and connections. If the user was, say, a musician, they might be told of a calendar event update that changed a rehearsal time, and Cortana would also know if the revised calendar slot conflicted with another appointment.

Yet, from Heck's point of view, this is just the beginning of a journey towards the evolution of digital personal assistant technology.



Heck says, "I believe the personal-assistant technology that's out there right now is comparable to the early days of search in the sense that we still need to grow the breadth of domains that digital personal assistants can cover."

Currently the focus is on the most common functions, such as reminders and calendars, but the team thinks Cortana opens up the opportunity for a fully contextual personal service. A service that knows understands your activity patterns, and which provides relevant recommendations, fast information access and important reminders.

The Cortana team intend to expand their focus and encompass a wider cross section of domains, plus different styles of user interaction including speech, multi-touch, gestures or traditional keyboard input.

Cortana And Windows 10

Initially, Cortana was exclusive to Windows Phone customers. However, when Windows 10 is rolled out (probably during the second half of 2015), a Cortana personal assistant becomes instantly available across a wide variety of platforms, including PCs and tablets.

Switch to another Windows 10 device, say from desktop to a mobile phone, and Cortana is smart enough to respond in a way appropriate for that particular platform. The goal is a seamless interaction experience regardless of what device you're using.

A key Windows 10 feature is the Cortana Notebook, where you can see (and edit) everything that Cortana knows about you. This is important, because transparency and control is held in high regard.

Cortana never adds anything to the Notebook without explicit consent, so if Cortana thinks you'd like to see the local weather forecast before you start your work commute, it first asks you to confirm if you do really want to see this information. And to deliver instant value, the Cortana setup experience includes a set of user profile questions.

For Windows 10, a considerable amount of effort has been directed at giving Cortana a district personality, rather than just a set robotic-style responses. In addition, Cortana provides feedback through a visual set of emotional states, so you'll instantly know if Cortana is happy or didn't actually understand your question. **mm**

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You no longer need to spend big to get a decent amount of SSD storage

The price of SSD drives continues to plummet, but how cheap does it get? With 240GB/256GB drives presenting the best balance of price and capacity, we decided to check a few out so you can ensure you get the best deal possible. Time to consign that creaking mechanical drive to the bin (or at least the secondary SATA port!).

Deal 1: Crucial 240GB M500
RRP: £105.08 / Deal Price: £71.99

The 240GB Crucial M500 is a fantastic deal when you consider it in terms of gigabytes per pound, and at 240GB it has the benefit of being big enough to run a computer system off, as long as you're not trying to store too much on it. Crucial is a prominent name in the RAM industry so you know you can trust its credentials, and although it's not the fastest drive around, the price makes it more than worth buying one. Or two!
Where to get it: Novatech - `bit.ly/1DX7PqR`

Deal 2: Kingston 240GB V300
RRP: £114.99 / Deal Price: £72.97

It might be cheap, but the Kingston SSDNow V300 is a solid performer, with 450MB/s write and 450MB/s read speeds. Durable, shock-proof and containing a customised LSI SandForce controller, this is one SSD you can trust to keep your data safe. And there's a three-year warranty if it can't! The V300 is, admittedly, a little long in the tooth, but at this price, it's hard to argue that it isn't worth it.
Where to get it: CCL - `bit.ly/1DX7IeH`

Deal 3: Kingston HyperX 3K 240GB
RRP: £130.00 / Deal Price: £95

Kingston's HyperX 3K line has been around for a while, but that makes its prices nice and low – especially considering the high 500MB/s read and write speeds it can offer. HyperX SSDs also use an advanced wear-levelling technology that distributes writes evenly across all the flash blocks in the SSD to maximise overall drive endurance, giving the longest possible life for the user while maintaining optimal performance. And still under £100!

Where to get it:
Pixmania - `bit.ly/1IoKzrV`

Deal 4: SanDisk 240GB Extreme II
RRP: £163.56 / Deal Price: £119.99

It might surprise you to learn that SanDisk's Extreme II SSDs are some of the fastest consumer drives available on the market. The specs alone speak for themselves: 550MB/s sequential read speeds and 510MB/s sequential write. The key to their success is that they don't run on the same SandForce controller as almost every other recent desktop SSD. Instead, they use a Marvell 88SS9187 controller paired with a small amount of high-quality SLC NAND memory, improving both performance and integrity. It's one of the most advanced drives on the market and available at a great price.
Where to get it: Maplin - `bit.ly/1DCUQKf`

Deal 5: Intel 530 Series 240GB
RRP: £164.14 / Deal Price: £113.24

Intel's 530 series drives are ideal for home desktop users, and now that they're a year old, the prices have dropped massively. Inside you'll find the ultra-reliable SandForce SF-2281 controller capable of 540MB/s sequential read and 490MB/s sequential write. You pay a little more for the Intel name, but a drive of this quality is too good to ignore when you're getting almost 30% off the price!
Where to get it: Dabs - `bit.ly/1JBOm6P`

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NEWS AND VIEWS

Sony's SmartEyeglass Gets VerbaVoice

Amazon Coming To A Car Boot Near You?

Prime postal service tested in Germany

Amazon is proposing another fantastical foray in deliveries with an update to its Prime service that could see parcels delivered right to customers' cars.

Not content with it's research into drones, and keen to find more ways to ensure we keep relying on it, this development has come about as a result of a partnership with Audi. The trial, which will take place in Munich, will see a group of Prime subscribers allow their cars to be tracked within certain time limits, in order to allow couriers to find them and place deliveries directly into the boot – in the hope of lowering the number of failed deliveries on the doorstep. The participants will also have to allow adaptations to the car's keyless access technology, to allow the courier to open the boot – though the access will then be revoked when it's shut.

Would you be concerned over things going missing, vehicular damage and even stolen cars? Yes? Glad that's not just us, then.

Google Launches Wi-fi-Cellular Switch

US-only launch for Project Fi

Google's US customers can now take advantage of a new service that swaps mobile coverage from wi-fi to celluar networks to help bring down data use.

Only working on Google Nexus 6 handsets, the Project Fi service will switch automatically between the two different networks plus wi-fi hotspots (over a million of them) depending on which has the stronger signal.

Customers will have to pay $20 a month plus $10 per GB of data used over a user's usual data limit, with phone credit for unused data.

This has got off the ground thanks to partnerships with the Sprint and T-Mobile networks and the project in currently in its 'Early Access Program' stage – a bit of a trial for now, basically.

If it proves a success, it could in theory make Google a go-to provider in the States in the near future.

QUICK BITS... Over 3,000 Apple Watch apps are already in the Apple Store for download

Impaired hearing catered for with tie-up

Sony has announced a collaboration with Germany's VerbaVoice in order to bring greater accessible communication for users with impaired hearing.

Audio content from a performance or presentation is sent to VerbaVoice's cloud-based platform to an interpreter who converts on the fly. The idea from there is that via the company's iCap app, Sony's users will be able to follow live performances, meetings etc without having to look away from the speaker.

As Sony puts its, this all could mean "live subtitles" with its smart glasses.

EE Unveils More Own-Brand Smartphones

4GEE devices offered up too

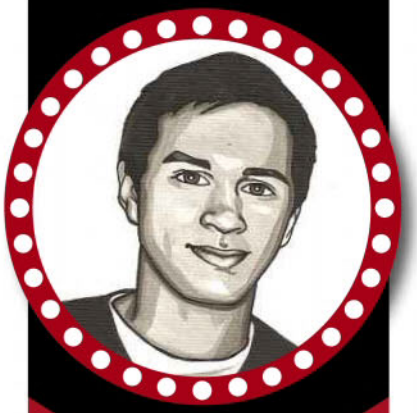
EE continues with its own-brand device rollout with the launch of the Harrier and Harrier Mini handsets.

The Harrier hosts Android Lollipop and its octa-core 1.5GHz Qualcomm Snapdragon processor provides the smooth multitasking experience we all want from our phones today. A Full HD 5.2" display offers what EE describes as "unprecedented picture quality for its class" and a 13MP rear-facing camera completes the key features EE wants you to know about.

Its smaller sibling the Harrier Mini comes with a 1.2GHz quad-core chip, 4.7" HD display and 8MP camera, plus will cost just £100 on PAYG.

Away from the handsets, EE has also introduced a couple of new 4G wi-fi devices – Osprey 2 and Osprey 2 Mini – providing customers with a 4G mobile hotspot.

Head to **www.ee.co.uk** for further details.



Do you own a 3D printer? I'm willing to bet that for most of you the answer is no, and I'm guessing your reasons will be similar to those identified by Mark Pickavance this week.

I don't own one of these devices either because, like Mark, I simply can't justify the cost. There's nothing that I need or want printed that I can't just buy more cheaply elsewhere.

And therein lies one of the technology's biggest problems. It won't save you money, and it probably won't save you much time either, because print times are slow and delivery times for pre-made items are fast.

Would I buy one if I could afford it, though? Without a doubt. It's a fascinating and exciting technology, and being able to make something solid out of something from a screen would be about the closest I'm ever going to get to a real-life, Star Trek-style replicator. And who wouldn't want one of those?

See you next time…

Anthony

Editor

Meanwhile... On The Internet...

Are we potentially reaching a tipping point when it comes to piracy? You have to wonder if there's a possibility that, at some point, the market for digital media could mature to the point where piracy is a marginal activity. The digital genie is never going to go back in the bottle, and the nature of file sharing will probably just shift in ways that will gradually become harder and harder to track. However, it's starting to look as if the use of it as the basis of any sort of business model is becoming a square that's harder and harder to circle and that the whole idea of filesharing as a large-scale industrial endeavour (as pioneered by Napster, way back when) is over.

As we prepared this column, we were greeted with several pieces of news linked to this. The major one was the closing down of music streaming service Grooveshark (**tinyurl.com/MotI1361a**) in the face of legal action from the Warners, Sony and Universal that could have seen its owners facing massive financial penalties. However, at the same time, we were also reading about a mass-mailed warning to major European torrent and filesharing sites (**tinyurl.com/MotI1361b**).

While Grooveshark's contrition was absolute, it's as yet unclear what the filesharing site's reaction will be to the email from Jan van Voorn, the MPA's (*inhale*) Vice-President Global Content Protection, Internet Operations (*and breathe). According to TorrentFreak, he wrote the following: "This Notice requires you to immediately (within 24 hours) take effective measures to end and prevent further copyright infringement. All opportunities provided by the Website to download, stream or otherwise obtain access to the Entertainment Content should be disabled permanently." However, what will happen at the end of that 24-hour period (if anything) is, at the time of writing, unclear.

What both stories directly illustrate is the continued targeting of sites and search engines as a tactic, as opposed to the largely self-defeating and negative publicity-generating approach of suing members of the public for files they have downloaded (though that still happens: **tinyurl.com/MotI1361c**). Indeed, as we have often argued in *Micro Mart* over the years, it was this tactic that largely created the 'Little Us' versus 'Big Them' paradigm that almost encouraged people to pirate, or at least have little sympathy for what the studios were trying to do.

As the film, TV and music industries have slowly grasped the idea that a service that's simpler than piracy will attract people to it, the lure of sites like The Pirate Bay has diminished, but only time will tell if we'll ever see a sensible cessation of hostilities.

While much of the regular world of TV across the globe lives or dies on its ratings, Netflix has never been overly keen on giving away information on how many people actually stream any given show using the service. As it does not carry advertising, it has long asserted that, while it does use viewer metrics in order to commission and acquire content and make recommendations (**tinyurl.com/MotI1361g**), it does not really care when or whether a subscriber watches a show or not. This, however, tends to frustrate content producers looking to create shows for the platform and those negotiating licensing content for its use.

It seems fitting, then, that just as the rest of the US TV fraternity is in the middle of its May 'Sweeps', which will be used to define the success or failure of many shows (and how much ad revenue a network can expect to make from it), work by Luth Research has allowed a little insight into how many people are actually watching Netflix's original content (**tinyurl.com/MotI1361h**).

The data was collected from a participating sample of around 2,500 volunteer Netflix subscribers who were using PCs, tablets or smartphones to access the service (as Luth does not yet have the ability to track viewing via TV) and involved an "industry first" application that can extract information from the encrypted data Netflix sends via its app. It showed that something like 11% of subscribers watched *Daredevil* within the first 11 days of its release, but that three season's worth of *House Of Cards* make it the most watched original series on the streaming service – and, apparently, the king of the 'binge watching' hill too.

Whether this will mark a change in how Netflix thinks is not yet clear. However, unless it suddenly begins to depend on ad revenue, it's still unlikely that it'll ever have to resort to the kind of stunts major US networks do to ensure sweeps success (**tinyurl.com/MotI1361i**). What it could do, though, is effect the money demanded of it in order to hold on to certain content in the face of growing competition.

If you haven't been following the whole Ross Ulbricht/Silk Road thing quite as closely as we have, we'd point you in the direction of an excellent long-form article by *Wired*. It does an excellent job of charting the fall of the site, and painting a vivid picture of some of the extraordinary goings on that led to the eventual conviction of the man authorities assert traded as Dread Pirate Roberts on the Dark Web, and generated a fortune in cryptocurrency while he was at it – not least a fake hit and the theft of a whole heap of money. Even if you do know the story already, it's worth a read (**tinyurl.com/MotI1361d**).

.AVWhy? Videos For Your Eyes... Not Necessarily For Your Brain

Do you need an excuse to watch Captain America and Iron Man duke it out in a old-school kung fu movie style? No? We didn't think so. We aren't asking for one either... so we'll simply point you in the direction of Beatdownboogie's YouTube site so you can enjoy it at your leisure (**tinyurl.com/MotI1361j**). If only we could type out of sync.

Aaaaaaaand Finally...

At the risk of grinding the working week to a complete halt, we'd just like to quickly point out that – courtesy of the Internet Archive – it's now possible to embed a whole heap of classic DOS games in tweets (**tinyurl.com/MotI1361e**). How to make friends and then lose them their jobs, eh? Oh, yeah, and here are some squirrels doing weight-lifting and fighting a dinosaur with a tank: **tinyurl.com/MotI1361f**. You're welcome. .

QUICK BITS... Microsoft has reported a 12% dip in profits for the first three months of the year. That still means

Caption Competition

This chap seems to be enjoying some pretty idyllic computing, but you still managed to see the funny side...

- **Boris: "**Glad I'm using Waterfox and Sea Monkey on this"
- **PlaneMan: "**Sailing the internet is much easier than surfing it!"
- **Think Tank:** "Cortana says 'I'm sorry, but the internet and I are having trouble talking at the moment'".
- **Boris: "**They told me that this laptop was specially designed for ocean-going use with its Seagate Barracuda Hard Drive."
- **JayCeeDee: "**No Siri! I said binnacle! I don't need any video editing software!"
- **JayCeeDee:** "So much for 'Find My iPhone'!"
- **tryanathlon:** "Hooked on Plaicebook!"
- **BullStuff:** "I'm all at sea with this programme."
- **Dwynnehugh:** "Perhaps not the best time to learn *Navigation for Novices* online."
- **Thomas Turnbull:** "Hmm according to my satellite Navigation System this should be my turn off for the Motorway service station off the M1."
- **Gary Mann:** "EXTREME Water cooling."
- **Wudger:** "Cortana keeps talking about 'any quay' but I'm all at sea."

Thanks to all of you for the chuckles, but the winner was Boris with "There must be an easier way of playing wav files?" To enter this week, head to the 'Other Stuff' section of our forum (**forum.micromart.co.uk**) and say something funny (but not too rude) about the picture below or email us via **caption@micromart.co.uk**.

Fruit Machine Player Lucks Out

Wins big but told "not really"

Imagine, just for a moment, that you are an 87-year-old grandmother from Illinois. Now imagine that during a family get-together in Iowa, you play a fruit machine and win a $41.8m jackpot. You're happy, right? We would certainly think so.

So happy, in fact, that you demand the payout from the casino, already dreaming of what you're going to spend all that money on. Only, you're not going to be able to enjoy life's riches as the casino in question refuses to pay out. Crushed, you choose to sue the casino and hope that one day you will get your money after all.

For Pauline McKee – the granny in question – that day will now never come as the Iowa Supreme Court has ruled that she will actually won a payout on the machine of just $1.85. Ouch.

The case runs back all the way to 2011, and the reason the casino doesn't have to pay her millions is because of a computer glitch on the machine in question. Apparently, the the rules of engagement when playing, state 'Malfunction Voids All Pays And Plays'.

Fact is, the maximum payout on this machine was only $10,000 and the court in the case ruled that McKee hadn't read the rules of the game, and was therefore never entitled to what she claimed. Heartbreaking for Ms McKee; a triumph for regulatory messaging. Not sure it feels entirely fair, though,

Man Sues Google

Joins a long queue, probably...

A man in Florida has filed a lawsuit against Google alleging that the firm didn't employ him because of his age.

According to *Ars Technica*, the allegations go that he was turned down in 2001 despite having "highly-pertinent qualifications and experience" and being described by a recruiter as being a "great candidate". He was 60-years-old when he applied and his case goes on to claim that the average age of Google employees is 29 years-old, way below the average age of all US workers (42).

He's looking to get a class action suit organised against Google on this, so we'll keep an eye on how this pans out.

Snippets!

Potter For GTA Doc

Daniel Radcliffe, he of *Harry Potter* fame, is to star alongside Hollywood actor Bill Paxton – he of *Aliens* fame – in a BBC documentary on the development of the *Grand Theft Auto* series. Radcliffe is to play Rockstar Games co-founder and developer Sam Houser while Paxton will play anti-GTA campaigner Jack Thompson in the drama that will apparently focus on how the game was developed and also the controversy surrounding the games' levels of violence.It will, of course, also look at the rampant success of the franchise.

Silent Hills No More?

The proposed horror sequel to the *Silent Hill* franchise, *Silents Hills*, has apparently been dropped. Movie man Guillermo del Toro told a film festival audience that the project, mooted to have been a joint effort between del Toro and Konami, now is "not going to happen". Actor Norman Reedus, who was working on the project, also later tweeted that he was "super bummed" about its cancellation. We would have put it in better terms ourselves but the feeling's mutual.

CyberCenturions 2015

Congratulations to the KEGS Young Engineering Club from King Edward VI Grammar School in Chelmsford on winning the 2015 CyberCenturion National Finals. The competition finals took place at The National Museum of Computing, with the Club beating another seven teams to the title. The event was such a success that it's already been announced that the cyber security event for 12-18-year-olds will all be happening again next year.

In fact, registration is open now at cybersecuritychallenge.org.uk, where you can also read further info on the event itself.

Man Shoots PC

Dell takes brunt of his anger in Office Space-style attack

To America once more and news now of a man in Colorado Springs who decided to shoot his Dell desktop PC eight times with a 9mm pistol. The reason for this frankly strong-arm perspective on how to deal with his issues was that the system had been playing up for a few months. When it presented him with the Blue Screen of Death one more time, it was to prove the PC's last.

The man in question didn't realise that he was breaking the law by shooting the gun. The police saw things differently, however, charging him with discharging a weapon within city limits. As for the shooter, unrepentant is probably the best description. "It was glorious," he said. "Angels sung on high."

"That computer had a bad day," he was quoted in *The Los Angeles Times*.

ARM Goes Faster With A72

Altogether better than A57

ARM's annual TechDay event will be chiefly remembered for introducing its new Cortex A72 chip. Faster and more efficient than the successful Cortex A57 processor, the new tech is billed as the firm's most advanced processor yet, delivering three and a half times the performance of Cortex-A15 based devices for powered-up smartphones. Optimised for the 16nm FinFET process technology, the chip can clock up to 2.5GHz and also benefits from lower power consumption, apparently achieving a 75% power reduction in representative mobile workloads.

Cortex A72-based mobile products are expected to land early next year.

Samsung's Flawed Fingerprint Technology

Hackers could take copies for bad deeds

Samsung had been embarrassed a little as news has emerged that hackers could take copies of fingerprints used to unlock its Galaxy S5 handset.

Security researchers at FireEye have warned that an Android flaw would make it viable to steal personal information to be used elsewhere. Samsung is reportedly looking into the claims, with the current system storing fingerprint information in the phone's TrustZone. The problem is that researchers have found that they can get to that data prior to it being stored away on all Android phones running Android 5.0 or earlier.

QUICK BITS... **Apple expects to ship 20 million Apple Watches this year**

Italian Eyewear Giant Working On Google Glass 2

CEO tells all to shareholders

You may have heard of Luxottica; you've definitely seen the company's products. The Italian eyewear giant is behind such brand names as Oakley, Ray-Ban, and Persol, while it also manufactures glasses under licenses from all the big names – Armani, DKNY, Tory Burch. Essentially, Luxottica runs the eyewear market.

It's particularly interesting, then, that the company's CEO has told shareholders that the firm is already working on the second version of Google Glass. The *Wall Street Journal* reported the news that the company head Massimo Vian has told shareholders that "we're now working on version 2, which is in preparation".

This is huge news. It's only been a few months since Google backed away from Google Glass' first iteration, and it seemed a concepual dead-end, but now it's apparently all hands back on deck. Luxottica's involvement also means that the glasses stand every of being backed by recognisable brands that matter to consumers.

Reports suggest that Luxottica is also working on its own Intel-powered smart eyewear, due out in 2016.

HyperX Goes Savage

Latest SSD promises 560MB/s; 530MB/s write

Kingston's HyperX division – nothing to do with comic book heroes, you understand – has announced the equally heroic-sounding Savage SATA-based SSD. HyperX Savage is powered by the Phison S10 quad-core, eight-channel controller delivering sequential speeds of up to 560MB/s read and 530MB/s write. The end result should be higher performance, ultra-responsive multitasking and a system that's markedly faster than before.

It also looks pretty neat, with a low profile red steel and aluminium case to fit notebooks, desktops and small form-factor builds. Available in 120GB to 960GB capacities, you can buy the Savage as a standalone SSD or with an upgrade bundle kit that includes a 2.5" USB 3.0 enclosure, bracket and mounting screws, SATA data cable, hard drive cloning software and more. There's more information at **www.kingston.com**.

Aussie Blogger Admits Lying Over Cancer

Uproar over posts detailing long battle with disease

Australian blogger Belle Gibson was well known for blogging about her long battle with cancer. Except that it's now emerged that she didn't actually have cancer at all and that the subsequent success that she built off the back of saying that she had survived the disease – she's sold books and been involved with apps – is all something of a sham.

Gibson told all to Australia's *Women's Weekly* magazine, stating that "None of it's true" and that she didn't want forgiveness. It doesn't appear she's going to get much, anyway; understandably, the media focus of the story has been the expected backlash.

NZXT Kraken X31 Closed Loop Liquid Cooler

Superior cooling and impressive features are the order of the day here

DETAILS

- Price: From ~£55
- Manufacturer: NZXT
- Website: goo.gl/Afpzlm

Required spec: Intel LGA 2011-3, 1366, 1156, 1155, 1150, AMD FM2, FM1, AM3+, AM3, AM2+, AM2, Windows 7+, Android, iOS

We've had a few liquid coolers fitted to our test systems in the past. The likes of Coolermaster, Corsair, and Thermaltake have impressed us with high efficiency, ease of setup and low maintenance kits. Now, though it's the turn of NZXT, a young company with some rather exceptional skills when it comes to keeping your PC cool.

The Kraken X31 is the entry level liquid cooling solution from NZXT, and features a wealth of mind boggling specifications.For starters, this is the world's first variable speed pump that utilises a spare USB header on the motherboard to communicate with the NZXT CAM software. With this in place you can effectively control the motor pump speed from 2400RPM up to 3600RPM, while being able to view a plethora of real-time information regarding CPU and liquid temperatures and helpful notifications as to what's using up your system resources. The pump can also be tuned to specific profiles, such as performance, silent, manual and so on – and you can even access the controls remotely by using the mobile version of CAM for iOS and Android.

It's a fascinating addition to an already quality product, and one that you could happily spend many minutes in front of tweaking to the highest possible degree. However the list of desirable features doesn't stop there. The large 120mm fan can be controlled to rotate at up to 2000RPM while still remaining whisper quiet, and the 400mm of flexible tubing is more than long enough for most system setups, including specialised PCs.

Fitting the Kraken is simple too, with mounts and standoffs for Intel LGA 2011-3, 1366, 1156, 1150, and AMD FM2, FM1, AM3/3+, and AM2/2+ CPUs; there's even a handy online animation that clearly walks you through the process depending on the type of socket you're fitting the Kraken to.

Needless to say, this is an exceptionally high quality liquid cooler. Every detail has been meticulously engineered to near perfection, even the thermal paste on the cold plate is spot on and neatly dispersed. Also the black aluminium radiator offers a slightly larger than usual area to help draw heat away from the coolant, with the aid of 120mm fan.

We were singularly impressed with the NZXT Kraken X31. The long tubing made it easy to wind around the internal chassis of our test system, while still keeping maximum airflow to other components. The high efficiency of the Kraken combined with its near silent operation, and the included six year warranty, is a must for those who put their systems through demanding overclocking or high intensity CPU tasks. And of course, the icing on the cake here is that variable speed pump and the CAM software.

The entire package is extremely good, and certainly one we can happily recommend regardless of whether you engage in extreme overclocking. Although it lacks a little aesthetically, there's no LED lighting and a solid black unit may not be everyone's cup of tea, there's a lot going for the Kraken.

In short, it's one of the best, most cost effective, liquid cooling solutions we've had the pleasure of testing. **mm David Hayward**

Specifications:

Model Number:	RL-KRX31-01
Fan Air Flow:	81.32 CFM (max.)
Fan Air Pressure:	0.44 - 2.76 mmH20
Fan Bearing:	Hydro Dynamic Bearing
Motor Speed:	2400-3600 ± 150 RPM
Fan Connector:	4-Pin PWM
Motor Voltage:	12V DC
Motor Connector:	3-Pin
Compatibility:	Intel LGA 2011-3, 1366, 1156, 1155, 1150 CPUs AMD FM2, FM1, AM3+, AM3, AM2+, AM2 CPUs
Fan Dimensions:	120x120x25mm
Motor Current:	325mA
Radiator Dim:	155 x 120 x 30 mm
Fan Noise Level:	18-34 dBA
Tube Length:	400mm
Fan Speed:	800-2000 RPM ± 10%
Fan Voltage:	12V DC
UPC:	815671012081
Control Method:	Kraken+ Software Module
Warranty:	Six years

You won't find a better liquid cooler for £55

AOC I2473PWY 23.8" LED Monitor

Mark reviews an interestingly featured monitor from AOC

DETAILS
- Price: £174 (Ebuyer)
- Manufacturer: AOC
- Website: tinyurl.com/kj77fll
- Required spec: PC with VGA or HDMI outputs, or a device that supports Miracast

In the past couple of years the monitor market has become very tough indeed, with lots of manufacturers chasing scarce customers. Prices are probably as low as they can realistically be, so the makers are always looking for new markets. The AOC I2473PWY is a product aimed at the teenage bedroom buyer, if I'm not mistaken, in that it provides better than average audio and a HDMI port for connecting a games console.

Technically, this is a repackaging of a 23.8" IPS LED panel that provides excellent viewing angles and vibrant colours. Along with HDMI, AOC has included VGA for PC use – forgetting that most machines come with DVI, HDMI or even DisplayPort these days. I'm not sure why they restricted themselves to two inputs, though, as there is lot of space at the back of the thick supporting base.

That base design choice is critical. Because the dual 7 watt Onkyo speakers aren't in the panel structure they've been able to make the screen very thin indeed, and it also has a bezel that's less than 1cm on all sides. That's nice, but the down sides are that you can't remove the monitor from its base, there's no practical way to VESA mount it, and it offers no swivel or height adjustment. Also, given the scale of the base, I was slightly disappointed that AOC couldn't find a way to get the PSU inside, thus leaving the I2473PWY with one of those annoying power bricks.

If this was the whole story, I'd seriously be wondering why AOC was asking this sort of money for this display, but thankfully it also has a potentially useful extra feature; Miracast. For those who haven't played with this, it's a wireless display technology that allows you to replicate what is being shown on a tablet, smartphone or PC without a physical connection. Or, that's the theory.

My experience of using Miracast generally has been unfavourable, however, as it seems an exceptionally flaky technology. The I2473PWY implementation didn't contradict those negative opinions, because testing with various devices yielded decidedly mixed results.

For example; to make this work smoothly on YouTube video required dropping the resolution to 480p. But it also tended to either crop or border displays, and forced my laptop PC into 1280 x 800 resolution, when natively it's the same as the screen: 1080p.

I don't entirely blame AOC for Miracast's foibles, but they did choose to make it a big feature in this hardware and it doesn't work well enough for that profile. It also has a long boot cycle to the Miracast mode, greater than the time to find a spare HDMI cable and plug in directly. This is something of a shame, because the screen offers excellent contrast, the 25 watt power consumption is miserly, and viewing angles are good. The sound doesn't offer substantial bass, but it is louder than monitor audio is normally.

If you're buying this for the Miracast feature, I'd pass, but as a general purpose screen for PC and console use it's very acceptable, if a little bit on the expensive side.

mm Mark Pickavance

A monitor with better speakers than most

Specifications:

Monitor Size:	23.8"
Visible Screen Size:	60.5 cm
Screen Format:	16:9
Brightness:	250 cd/m² (typ)
Contrast Ratio Dynamic:	50.000.000:1
Contrast Ratio Typical:	1.000:1 (CR)
Pixel / Dot / Pitch:	0.2745 (H) x 0.2745 (V) mm
Display Area:	527.04 (H) x 296.46 (V)
Viewing Angle:	178 (H) / 178 (V) (CR>10)
Response Time:	5 ms GTG
Power Consumption On:	25W, Standby: <0.5W, Off: <0.5W
Dimensions (WxHxD):	547.1 x 408.6 x 182.6 mm
Weight:	4.12 kg wo/packaging 6.46 kg w/packaging
Warranty:	Three years

micro mart
Quality 7
Value 6
Overall 7

Drift Stealth 2 Action Camera

A small camera ready for plenty of action

DETAILS
- **Price: £199**
- **Manufacturer: Drift Innovations**
- **Website: goo.gl/ilzuxA**
- **Required spec: Windows XP+, Mac OS 10.2+, Linux, Micro SD card class 10 or better, Drift Connect app optional**

EDITOR'S CHOICE micro mart

It's fair to say that GoPro has an almost strangle hold on the action cam market at the moment. It's hardly surprising since we're regularly fed video clips from notable organisations or personalities, such as the recent GoPro feed of the astronauts. It's difficult to see another contender being able to its head enough to be seen in such an environment. However, Drift Innovation's Drift Stealth 2 Action Camera may well be one to send shivers down the collective spines of the GoPro community.

This is a ridiculously small video camera that can film in full 1080p at 30 frames per second, while still weighing only 97g and measuring just 80 x 42 x 27mm. That's not all this remarkable little device is capable of, though.

It has a three hour battery, a 300° rotating lens, and it's rugged enough to withstand rain, snow, mud and dust. As well as being able to record video in full HD, it can capture still images either singularly, in a rapid photoburst mode, or as a series of timelapse stills, all in resolutions up to 12MP. You can even take a photo mid-video recording, or tag image and video sections as important so as not to be overwritten.

If that wasn't enough, the Drift 2 has a built-in wi-fi module that can be paired with the Drift App, available on both Android and iOS devices, which allows you to remote shoot video and images from the camera while controlling everything from your phone.

The packages comes with the Drift Stealth 2 Action Camera itself, a set of instructions, a goggle mount, universal clip, micro USB cable and both curbed and flat surface mounts. All in a professionally turned out, and neat box.

Setting the camera up is an easy enough job. You simply unscrew the rear hatch, revealing an SD card port, mini HDMI port and the micro USB port, and insert a class 10 or better Micro SD card. You then plug in the micro USB cable and after a couple of hours' charging the Drift Stealth 2 is ready to start filming.

Operating the camera is also very easy. There are only three rubberised buttons on the top of the Drift Stealth: Mode, Cycle Option, and Action (which accounts for on, off, record and stop). Within the internal settings menu you'll find a long list of options, ranging from exposure through to speaker volume, LED backlight timings, and the ability to format the SD card or update the device's firmware. Once you have the right settings, though, depending on what you intend to use the Drift Stealth for, then there's really very little need to visit the options menu again.

The Drift Stealth 2 may seem like a backwards step in terms of video resolutions when compared to its chief rivals – the GoPro and others like it now offer 4K resolutions – but 4K is still very much an emerging technology and in all honesty it's going to be a few years yet until every technology and entertainment user has a 4K TV or monitor in their possession. So, while the other action cameras may seem alluring with UHD resolutions, the Drift Stealth 2 provides the more widespread and stable full HD experience.

The Drift Stealth 2 is a superb action camera, with a list of features that are far too long to mention in a single review. It's light, small, but very tough, and will no doubt provide you with many breath taking actions shots throughout its lifespan.

mm David Hayward

A great little action cam, with an abundance of features

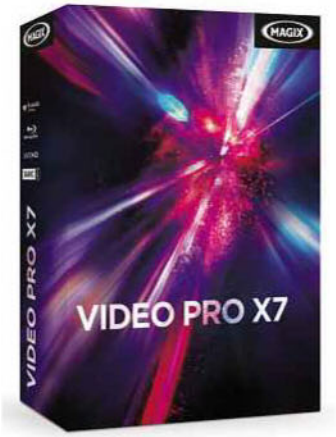
micro mart
9 Quality
8 Value
9 Overall

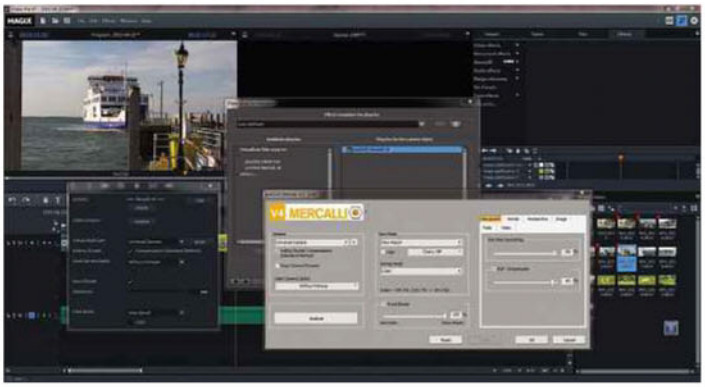
Video Pro X7

Magix updates its top of the range video editor

DETAILS

- **Price: £349**
- **Manufacturer: Magix Website: www.magix.com/uk Required spec: Dual core 2.4GHz CPU, 2GB RAM, 2GB HDD, DVD drive, GPU with 1280 x 1024 resolution, Internal Sound Card. Microsoft Windows 7 and 8, 64-bit systems**





Magix publish a wide range of video editing solutions, from those costing just a few pounds, to the product that's the subject of this review: Magix VideoPro X7. This is the most comprehensive and most expensive product in its range, but if you're serious about the videos you take, it's could well be worth being as serious about how you edit them.

If you only produce the occasional slideshow, or video taken on holiday, for example, then one of the other products in the Magix range would certainly do the job. However, for the dedicated amateur or professional videophile, VideoPro X7 offers so much more. While it represents a substantial investment, when when you add up what you get for your money, we believe it's well worthwhile.

This latest version has over 50 new features, ranging from hardware-accelerated H.264 video decoding, to MultiCam editing in real time on up to nine tracks. It's also the first product to include the full version of proDAD Mercalli V4 video stabilisation. This normally costs $299, and is still on sale at that price. If you take action shots, use a GoPro or similar camera, it's pretty much an essential part of your toolkit. The reason being that the majority of DSLR's, or Pro Video cameras use CMOS sensors that don't handle vibration or shaking very well. This results in the introduction of even more distortions when the sensor tries to correct the problem. It seems that Mercalli is one of very few products that can automatically correct both shake and CMOS distortions.

Indeed, one issue with super zoom cameras – particularly when using them at the extreme end of their zoom range – is the introduction of camera shake, which can render the footage unusable. While I have to admit to a little scepticism when I read the press bumph, Mercalli really did produce spectacular results – so good, in fact, I was able to use some video footage that I'd originally abandoned.

In keeping with similar professional editing products, Magix has overhauled the interface making it more user friendly, with a darker more modern looking design. Where you can move and save window locations, output the preview monitors to separate screens and assign your own shortcuts that are saved with each project. Also, as I mentioned earlier the rendering times and playback is greatly improved due to the hardware accelerated decoding done by the GPU. In practice this provides a better workflow, because you're not constantly waiting for the program to catch up.

Yet what I particularly like about VideoPro X7 is the subtle changes that have obviously come about as a result of feedback. Like the markers that tell you a clip has been used, the small arrow that appears when you hover over a clip that inserts the clip at the click of a button. The same feature is used to preview effects, only they are shown in the preview monitor.

Other new features include full 3D support, where editing is no different that with 2D because the footage is automatically synchronised. They've also added import and export support for the professional XAVC S format.

While I've only highlighted what's new in this release, it's worth remembering that this was already a very accomplished program. It includes some sophisticated editing tools, such as slow motion, chroma key, colour correction and enough effects to satisfy Spielberg. As if that wasn't enough, users of VideoPro X7 can download all the compatible content from Magix Movie Edit Pro 2015 for free; these include transitions, intros/outros, movie themes and other decorative elements. This amounts to over 6GB of excellent material, designed to make your videos more interesting and professional. It also allows you to easily create hundreds of new themes that look fresh and individualistic. **mm Joe Lavery**

More usability added to what was already a very polished product

Acer Chromebook CB5-311-T7LG

Mark is seduced by a laptop that owes little to Microsoft or Intel

DETAILS

- Price: £280 RRP
- Manufacturer: Acer
- Website: www.acer.co.uk
- Required spec: Wi-fi access to the Internet

Too hugely exaggerate, I've been trying to get my hands on Acer's Chromebook since the formation of the early solar system. I was therefore delighted when it provided its latest CB5-311-T7LG so I could experience how these devices have evolved from the initial hardware released when Google's Web OS first appeared.

The early Chromebooks weren't that great, and there was much chuckling from the Apple, Intel and Microsoft corners of the tech industry. They're not laughing with the same conviction now, as these devices are now one of the biggest selling technology items on American college campuses.

Picking up the CB5-311-T7LG, it's easy to understand why; at £280, or less, this system provides almost perfect access to Google's apps and services, in a lightweight and sturdy form factor with genuine all-day battery life.

Surely, that's what many people spend literally thousands of pounds on Ultrabooks to do, so how does this differ? Less than you'd think, confusingly. From the outside this looks for all purposes like a high quality notebook, as it has a 13" display, a webcam, full sized keyboard, touchpad, dual USB 3.0 ports and even HDMI out. Where it starts to diverge is that it's all built around the Nvidia Quad-core Tegra K1 processor, an ARM device that isn't Intel x86 compatible. Therefore this machine has more in common with Android phones and tablets from a purely architectural perspective. That has some implications which we'll come to later mention later, but what it can do really well is run the Chrome OS and its associated Google applications.

> "At £280, or less, this provides almost perfect access to Google's apps"

Open the clam-shell design and put in your Google password and you'll be browsing and Gmail-ing away in just a few seconds. Internet access is via inbuilt 802.11ac wi-fi, and some of the applications are designed to work offline. That allows you to work away from a connection and then sync when one becomes available, in a pseudo-cloud way.

Specifications:

Operating System	Chrome OS
Processor Type	Nvidia Tegra K1 CD570M-A1 (2.1GHz Quad-core)
Memory	4GB DDR3L SDRAM (1,600MHz)
Storage	32GB eMMC SSD (24GB useable)
Display Type	33.8cm (13.3") active matrix TFT colour LCD
Screen Resolution	1920 x 1080
Graphics	Nvidia Kepler
Wireless Networking	IEEE 802.11ac, Bluetooth 4.0
Built-in Devices	720p Webcam, SD Card reader, Microphone
HDMI	Yes
USB Ports	2x USB 3.0
Maximum Battery Run Time	11 Hours
Maximum PSU Wattage	45W
Size (H W D)	18mm x 327mm x 227.5 mm
Weight (Approximate)	1.50kg

The video performance is especially good, and you can use this machine to playback HD movie files very cleanly indeed. The only issue I had was that when dealing with MKV files some audio codecs aren't supported. The H.265/HEVC player – downloaded from the Chrome Store – fixed that problem partially.

However, there are apps – mostly games like *Bastion* – that use 'native' x86 clients and thus won't run on this hardware. Google, for its part in this, has released development tools that allow coders to create executables that work on both ARM and x86, but the density of ARM Chromebooks isn't high enough yet to expect globally converted software immediately.

What it also obviously won't do is run Windows applications, so if that feature is critical to you then this isn't the 'droid you're looking for. Conversely, if you want a machine to take away that can be used to access the internet, playback movies and music, access streaming services, review SD card photos, then you'll be happy.

However, the hardware is certainly not perfect in every aspect. The 1080p display is something of a mixed blessing, because the interface is too small for older eyes, and I dropped it to a lower resolution to make if more useable. The viewing angles are generally limited, and the colour representation is somewhat subdued. I also wasn't a fan of the thin tubular power jack, a primary candidate for accidental breakage if ever I saw one. Beyond those points, and considering the cost, this is a very nice solution.

One warming however: this review model is the CB5-311-T7LG, but you can get it's lower-specified brother (CB5-311-T9XM) for £199 or less. That saving of £90 or so means you only get a 1366 x 768 display, 2GB of RAM and 16GB of storage, but It's up to you if the price difference between it and this justifies the extra spec for what's a mostly cloud based user experience.

If you can develop the I-don't-need-Windows mind-set then you'll have a computer that does most of the critical jobs, isn't always desperately in search of mains power, and requires little or no software maintenance. Also, to sweeten that deal even more, Google will give you a 100GB boost to your Google Drive capacity for two years when you buy one.

Apple and Microsoft should be very worried, because the Chromebook era is here and it's eminently affordable.

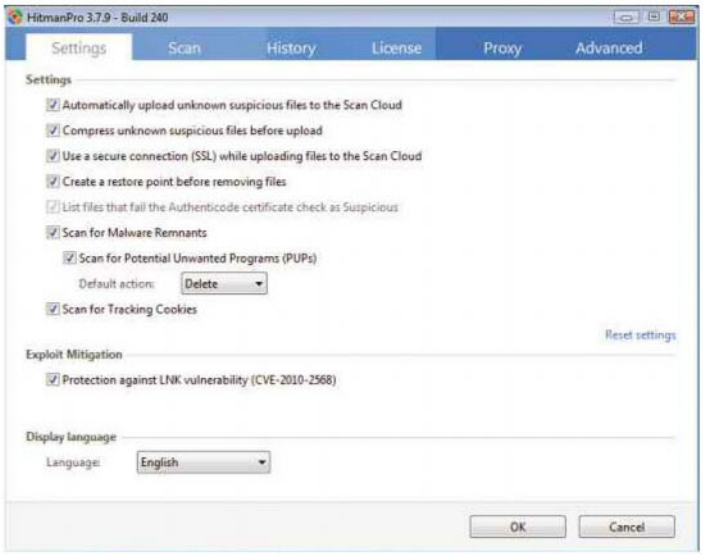
mm Mark Pickavance

At last a Chromebook that's built for the job

HitmanPro 3

Is your PC infected with malware? **Roland Waddilove** recommends getting a second opinion

DETAILS
- **Price: £17**
- **Manufacturer: SurfRight**
- **Website: www.surfright.nl**
- **Required spec: Windows XP, Vista, 7, 8, 10, 1GB RAM, 1GHz processor, 10 MB disk space**



A common complaint from people that have had their computers infected with malware is that they had security software, but the system was infected anyway. It seems that some malware can bypass some antivirus software. What is the answer, two antivirus programs? Well, this is where HitmanPro 3 comes in.

HitmanPro describes itself a 'second opinion malware scanner'. It is not intended to be the only or primary security software on a computer and instead it adds another layer of protection to whatever is installed. Normally it is not a good idea to install two antivirus programs, but HitManPro is an on-demand scanner that runs when you want it to rather than all the time. It does not have any real-time detection capabilities and you just click it when you want to check for malware.

The first time HitmanPro is run, there is an option to run it once only or to install it and add a desktop shortcut. This means you can carry it on a USB flash drive to check other computers you use without installing it. If you do choose to install it, there is also an option to configure it to run on startup to scan the system for malware. If nothing is found, it quits afterwards and does not run all the time, so it doesn't interfere with your primary security software. Scheduled scans can also be configured and these can be daily or only on a specific day of the week. A scan can be standard or quick and there are option to put them off if a full screen application, such as a game, is running, or to wait until the computer is idle.

The main window has no menus and just a couple of buttons. This is a malware scanner and so the only options are to scan or to configure the scan. There quite a few configuration settings and there is an option to upload unknown suspicious files to the cloud where they can be scanned by security software from five different vendors to get not only a second opinion, but third, fourth and so on. This reduces the likelihood of false positives where a genuine program is mistaken for malware, and it increases the chances of detecting real malware. Many security programs upload suspicious files these days, but they probably don't use other vendors' software like HitmanPro does.

In addition to scanning for live malware, HitmanPro can also scan for malware remnants or leftovers from previous infections. It can scan for PUPs (potentially unwanted programs), and tracking cookies that advertisers and other internet companies use in web browsers. There is an option to show what it calls early warning scores. This seems to make it more sensitive to potential malware, but the downside is that false positives may be shown and you need to be an expert to tell what is okay and what is not.

HitmanPro 3 costs £17 for one PC, but only £26 for three. You can actually install it and use it for free and in free mode it scans, detects and lists the malware on the computer. Paying users also have the option to remove the infections too. I found it to be a useful tool and it is recommended.

mm Roland Waddilove

> **"It is not intended to be the only security software"**

A good way to get a second opinion

iKettle

Michael lets his mobile do the work of switching on his kettle

DETAILS
- Price: £100
- Manufacturer: Smarter
- Website: www.smarter.am
- Required spec: n.a.

While medical opinion and certain technological products, such as activity trackers, encourage the general population (including yours truly) to get off their backsides and do more exercise, other aspects of technology could be said to be encouraging a more couch-potato type of existence. Maybe I am being a little harsh, but the term 'couch-potato' immediately sprang to mind when I started to review the Smarter iKettle device.

Like the teasmaids of yesteryear, the iKettle boils water automatically so you can brew your favourite beverage. However, rather than simply being on a time, the iKettle is at your remote command via an appropriate mobile device by communicating with via its own built-in wi-fi network.

Available in a range of colours, including blue, black, red and the aluminium of my review sample, the iKettle has a capacity of 1.8 litres. The body of this receptacle is totally enclosed meaning there is not a viewing window that can be used to check on the current water level. Mounted on the side of the iKettle is a sturdy rubberised handle that incorporates a release button for the top of the device when it does need a refill.

When in use the iKettle needs to sit on its power platform connected to a mains power source. This base unit features an arrangement of buttons for selecting the choice of temperature at which the water will be heated. You have a choice of 65, 80, 95 or 100 degrees to suit the beverage you intend on making. There is also a keep-warm option, acting similar to an urn, with the default setting of 20 minutes duration. Completing this arrangement of controls is the power button which insists on flashing to indicate power is available apart from when the boiling operation is in progress.

While you can use these buttons to control the iKettle, there is the key option to remote control using a downloadable free app available in iOS and Android flavours. This review is based on the Android version of the app.

When first run the app sets out to instigate a link between the iKettle's network and that of your home network. Initially I attempted this link-up from the kitchen where the iKettle would live. However, despite several attempts, I was unable to establish a link. In fact it was not until I moved the iKettle close to my router that a connection was made and I was able to implement remote controls.

The main interface of the iKettle app consists of a number of circles representing the controls found on the base unit. You can turn on the iKettle and select the required temperature with the appropriate buttons being highlighted in either red or blue until the boiling process is complete.

According to the product's Instruction Booklet, you should hear a beep from the iKettle and be advised by the app to signify the water has been boiled. However you would need to be in the same room as the iKettle to hear the low volume beep while the only indication delivered by the app was when the circle highlights disappeared.

Further options are available to schedule a Wake Up call that includes turning on the iKettle at a set time or have your imminent arrive at home detected so that the iKettle has boiled the water ready for a welcoming drink. Both of these features would have been appreciated if only I had managed to get either of them to work. mm **Michael Fereday**

A nice idea but one that failed to impress me

GROUP TEST

Colour Laser Printers

Colour laser printers were once the luxury of big companies and publishing houses. These days, you can buy one for the small office or even the home.

This week, David Hayward takes six printers and distresses their lasers by forcing them to print his topless beach photos. But don't worry, it's all in the name of science – and to find out which printers are actually worth buying.

Colour Laser Printers

Lexmark CS310N

DETAILS
- **Price: £84.99**
- **Manufacturer: Lexmark**
- **Website: goo.gl/lkn2KD**
- **Required spec: Ethernet cable, any OS or platform**

If you'd told us quite a few years ago that by 2015 we'd be able to buy a colour laser printer for under £100, we'd think you were, well, barmy, to say the least. These days, though, and thanks to Lexmark, that statement is entirely true. But is the printer in question actually any good?

The Lexmark CS310 range was launched a couple of years ago now and has proved to be quite popular for home owners, small businesses and enterprise users alike. The Lexmark CS310n is a four-colour cartridge printer that can take 250 pages on a standard input capacity tray (with the option to purchase an additional sheet feeder) and comes with a pretty decent 750-page CMY colour and black toner cartridge.

Connectivity comes in the form of USB and Ethernet, with an optional wi-fi adapter available through various Lexmark retailers. It's powered by a dual-core 800MHz processor with 256MB memory installed as standard, but again this can be upgraded to a far more impressive 2GB, should you ever deal with ultra large documents from many users.

The business side of the printer is apparent, as it's compatible with Windows, Mac, various Linux distros, Citrix MetaFrame, UNIX and Novell systems. That same support also extends to the many network printing protocols and methods, as well as network management protocols. There are far too many to list, but simply put, there's not much this printer can't be connected to and work with.

For the home, though, this is quite an impressive workhorse. The above may seem a little extreme for printing out the odd receipt or full-colour holiday snap, but at least you're guaranteed a higher than average level of technology.

In terms of quality and speed, the Lexmark was certainly very good. The text test page printed within 12 seconds for the first page, then around 25 pages per minute thereafter. The text was clear and readable, and although we've seen sharper prints before on other models, generally speaking the output from the CS310n was more than adequate.

The same can be said for the colour output, which spat the first page out in 14 seconds and after that settled down to about 27 pages per minute. Colours were good, reasonably bright and well balanced. Provided you're not thinking of producing a professional colour manual, the overall output here should suffice.

The cartridges can cost a fair bit, such is the way with colour lasers. The best price we found for a multi-pack (black, blue, yellow and magenta) was £282. This is for a 3,000-page yield on the colours and 4,000 pages with the black, which roughly equates to 2.1p per page, and that's with a genuine Lexmark set of cartridges. Premium toner packs cost around £132, but only have a 1,000-page lifespan in them, making the cost rise to 3.3p per page.

The icing on the cake here, and regarding how we began the review, is the fact that the Lexmark CS310n can be bought for around £85. It's not a bad price, since this is a better than average printer and one with many more features hidden up its metaphorical sleeves.

If you can happily factor in the cost of the toner, then the Lexmark CS310n is worth checking out.

HP CP1025

DETAILS
- **Price: £112**
- **Manufacturer: HP**
- **Website: goo.gl/5saHu4**
- **Required spec: Mac, Windows, Linux supported. USB cable needed, optional network**

The LaserJet Pro CP1025 is getting on a bit now, in technology terms, having been released in early 2013. It is, however, still going strong and obviously still makes enough for HP to warrant the line being kept alive.

The CP1025 is actually quite a small, compact colour laser printer, measuring 400 x 402 x 255mm, which may appeal to those who are limited by desk space. It's a USB-only connection, though, which limits its uses unless you opt for the optional wi-fi component or you get a little creative in the way you set it up on your PC.

It's also quite a basic affair, lacking any sort of LCD information screen and having a rather poorly built flip-down front input tray, which can take 150 pages, the CP1025 seems to try and get by on its glossy black-and-white plastic looks.

On the inside, you have an HP-designed 264MHz RISC processor, along with 8MB of SDRAM and an additional 128MB flash memory module.

> **"You can have far better in terms of quality and overall cost"**

The toner cartridges are fed in via a carousel setup, where the printer will rotate to the relevant colour and print to a transfer belt before printing to the page. Although this makes it quite easy to change toners, since you just select the colour from the control buttons on the right-hand side of the printer and the printer rotates to the selected toner, it does make for a much slower printing speed.

In our text test, the average print speed was about 14 pages per minute. Colour came in at just three pages per minute. These number aren't too far off the HP-stated specifications, and provided you're not in a hurry to take the sheet from the printer, they'll suffice for most users.

In terms of quality, the output from the HP CP1025 wasn't all that great. It wasn't terrible either, mind you, but it did lack a level of sharpness to the text that we've become accustomed to with more expensive printers. The colour prints too weren't that impressive either and felt a little muted.

The cheapest we found the toners for came to £120.62, for a multi-pack black and three colour. The black cartridge had a yield of 1,200 pages, whereas each of the colour cartridges had just 1,000 pages in them. This equates to about 2.9p per page, which can became quite expensive over time, especially since you're only getting a thousand pages out of the pack before you'll have to replace them.

The HP CP1025 isn't a totally awful printer. At £112 or thereabouts depending on where you shop, it's a good price for a colour laser for the home. But as we've seen so far, with the Lexmark, you can have far better in terms of quality and overall cost. Based on that alone, it's difficult to rate the CP1025 that highly.

No doubt, if you're a diehard HP fan, then the CP1025 will be great. Otherwise we'd recommend you spend a bit more time shopping around.

Colour Laser Printers

Dell C1765NFW

DETAILS
- **Price: £150**
- **Manufacturer: Dell**
- **Website: goo.gl/cus8oo**
- **Required spec: Windows, Mac, Ethernet cable needed**

When is a laser printer not a laser printer? Answer: when it's a Dell C1765nf. Dell has often provided its customers with cutting-edge technology, in its range of laptops, desktops, servers and networking hardware and especially with its range of mutli-function printers. The C1765nf is no exception to that rule, as this is actually an LED printer.

LED printers aren't a new technology; several printer manufacturers have been using them for a while now, but since this is the first one we've had the pleasure of testing, it makes the concept quite exciting.

An LED printer differs slightly from a more traditional laser printer, in that instead of using a laser to target a spot of toner (very layman's terms here), the LED uses an array of LEDs across the entire page print area. The process doesn't make an LED printer faster or have a better quality output, but it makes them cheaper to manufacture and in some respects a little more reliable, since there are fewer moving parts.

Moving back to the Dell, this is an all-in-one office masterpiece that scans, copies, faxes, prints and has support for USB, Ethernet, wi-fi, mobile printing, cloud printing and goodness knows what else. The only thing it apparently doesn't do is make the tea.

As standard, it has a 150-page tray, a 295MHz processor, 128MB of memory and supports a number of operating systems. Controlling and administering the printer is easy enough via the LCD panel and numerous buttons; the same goes for setting it up on the network as well.

Print speeds were okay, with the page of text coming through at a rate of about 12 pages per minute and the colour taking a little longer at ten pages per minute. However, we did find that the printer took nearly four minutes to start printing, during which time there were some horrible grinding noises coming from somewhere in the bowels of the chassis.

The print quality wasn't brilliant. The text came out about the same quality as the HP CP1025 which, while okay, wasn't as sharp as we would have liked. The colour too was muted and quite dark. Whether this is something inherent with an LED printer, we're not sure.

The genuine Dell toner multi-pack costs around £184, with a yield of 2,000 pages for the black and 1,400 for the three colours. This works out at about 3p per page, but if you shop around for the premium cartridge version, you can pick up a multi-pack for around £55 for the same page yield. This means that with the premium cartridge version you'll be getting something like 0.9p per page, which isn't too bad at all.

Overall, the Dell C1765nfw is a very capable printer. The fact that it does so much is certainly a selling point, although how many of us fax these days? The print quality isn't all that great, though; the text is average, and we'd say the colour output is slightly below average. But it can be cheap to run and maintain, and that certainly counts for something.

Samsung CLP-360

DETAILS
- **Price: £136**
- **Manufacturer: Samsung**
- **Website: goo.gl/nkT2W2**
- **Required spec: Windows, Mac, Linux. USB cable needed**

The award for the world's smallest colour laser printer may well have to go to the CLP-360 from Samsung. At just 382 x 309 x 210mm, this is an amazingly compact laser printer that will look great perched on a desktop at home or in an office. But is it any good?

Despite its size, the CLP-360 does manage to house a 150-page cassette, a 300MHz processor with 32MB of memory and a USB connection – sadly no wi-fi or other network connections, though.

The design of the printer is pretty sparse, with just a few control buttons, with power to one side along with a lift-up flap of plastic in the output area on the top of the printer. On the plus side, it looks quite good with the blue and white colours used throughout.

That aside, the text page test averaged a print speed of around 15 pages per minute, with the first page being spat out within the first 15 seconds. The colour pages were much slower, at a more sedate three pages per minute, with the first being out within 30 seconds of sending the print through.

Before we move onto the quality of the printouts, it's worth mentioning that this particular CLP-360 gave us an excessive amount of grief when printing. For starters it refused point blank to even print, stating that the printer was offline when clearly it wasn't. When it did eventually take the data, we had frequent paper jam warnings and, for some unknown reason, blank pages fed through the mechanism. We're not entirely sure what was going on, to be honest, but suffice to say, based on our experiences here, this isn't a particularly reliable make of printer.

Print quality, when it did appear, was generally okay. The text was reasonably sharp and very readable, and the colour prints too were clear, had bright colours and a good resolution. In fact, the Samsung CLP-360 probably had the best output of all the printers; it's just a pity it was such a nightmare to actually the output from the printer in the first place.

Costs for replacement toner vary, but one of the cheapest we found was £97.16 for a multi-pack of genuine Samsung toners. The colour cartridges give a page yield of 1,000 pages, with the black offering 1,500 pages. This equates to around 2.2p per page, but here lies another issue we have with this particular printer.

When we weren't having paper jam issues, or anything else for that matter, the printer gobbled up toner like there was no end to the stuff. Just in the tests we ran, we managed to dry up a 750-page black and colour pack of toner within half an hour. We suspect that if this is the case, then thousand-page toners aren't going to last much longer, especially if you're doing high-volume printing.

The Samsung CLP-360 is a small colour laser that looks nice enough to show off, and in all fairness, it does produce a good quality print, but it's far too flaky and expensive to run to justify the initial cost.

Brother HL-3170CDW

DETAILS
- Price: £152
- Manufacturer: Brother
- Website: goo.gl/ODqx4e
- Required spec: Mac, Windows and Linux systems supported

You wait ages for one LED printer to appear, then along come two in a single group test. Typical. This one is a Brother HL-3170CDW, a reasonably compact printer that's aimed at the small, busy office or home setup, where the users need lots of connectivity and reliability.

As stated, this is an LED printer that has a tantalising range of features available. The 333MHz processor, with 128MB of memory, helps drive a printer that has ample connectivity in the form of USB, Ethernet and 802.11 b/g/n wi-fi. Mobile connectivity is supported well, with AirPrint, Cortado Cloud Print, Google Cloud Print, iPrint&Scan and WiFi Direct and, of course, you can administer over the network just as well as if you were standing in front of the tiny LCD control screen.

Additionally you also get an automatic double-sided print to save paper and a 'Deep Sleep Mode', which can be configured to send the printer to sleep for a specified amount of time after the last print. When in this mode, the printer then drops to a very economical 1.5W power consumption, and to add to that, when a print does come through, it takes about 12 seconds for the printer to 'wake' up and start printing.

There's a 250-page input tray as standard, which fed our text test pages through at a rate of around 16 pages per minute, with the first page appearing within 18 seconds of the request being sent through. The colour print rate was good too, with our non-scientific method of counting pages coming to around 12 pages per minute.

The page quality was very good indeed, on a par with the Samsung model. However, in this case, the Brother worked every time we sent something through, and it was quiet too.

The text page quality was sharp and readable, and the colour page test was remarkably good and of a much higher quality than we initially thought it would be. In fact, the HL-3170CDW had the best overall print quality in the group so far.

The replacement cartridges are reasonably priced as well. The genuine Brother multi-pack for this model costs in the region of £145 and offers a yield of 2,500 for the black and 1,400 for the three colours. This setup comes to around 2.1p per page for consumer costs, but we also found a premium brand that offers a 2,500 page yield for the black cartridge and a better 2,200 pages in the colour cartridges for just £124, making the consumer running costs 1.4p per page.

Although the initial cost of the printer is £150, again depending on where you shop, the lower running costs and higher than normal yield of the average toner replacements make for a far more efficient printer. And considering the quality of the print you get, the ample connectivity and the power saving feature, the Brother HL-3170CDW certainly has a lot going for it.

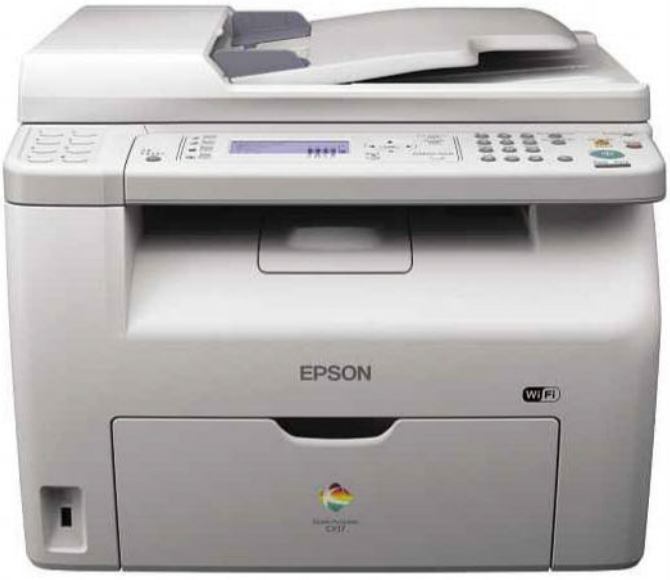
Epson AcuLaser CX17WF

DETAILS
- Price: £370
- Manufacturer: Epson
- Website: goo.gl/A0QDdO
- Required spec: Windows, Mac. USB cable needed

In the past, a multi-function colour laser printer was usually a monster of a machine sat in the corner of an office, sucking up power to the point that the lights would dim when it warmed up. That's not the case these days, as Epson hope to prove with its AcuLaser CX17WF.

This is a four-in-one multi-function colour laser, with print, copy, scan and fax capabilities using the Epson AcuBrite toner technology system. The AcuBrite system claims that by using smaller, chemically grown toner particles, along with special pigments, a far greater degree of print quality can be achieved. As well as quality, though, the AcuBrite system states that it has less of an environmental impact through its manufacture and use.

In addition, the CX17WF comes with USB, Ethernet and wi-fi, and has support for a number of network management protocols across both Mac and Windows operating systems – nothing specific for Linux, though.



The CX17WF comes with a 150-page standard input tray, which fed our text page tests through at a reasonable 14 pages per minute, with the first page being printed at around 16 seconds. The colour pages were measured at a more sedate eight pages per minute, with the first colour page printed within 20 seconds of the data being sent.

The print quality was good throughout. The text was clear, sharp and very readable. The colour pages too were good, although the reds did seem a little darker than the other examples we've had, with the exception of the Dell. However, the other colours used were quite bright and vibrant – enough for a good print out of a photo, in our opinion.

The genuine Epson toner multi-pack we found cost £155 and offered a 1,400 page yield for the three colours and 2,000 pages for the black. This came to around 2.5p per page, but we also found a premium multi-pack of cartridges for just £46.75, with the same colour yield of 1,400 but with 2,200 pages for the black. This dropped the overall cost to an impressive 0.7p per page, making this model the most cost-efficient of all the replacement toners so far.

However, despite the good points here, we did come across a couple of problems. The first was with the setting up of the printer, where some of the scan-to options refused to work. We also had an problem where the wi-fi was continually dropping, even when we moved the printer closer to the router. This we solved by setting the printer with a static address, so it could have been an issue with the router as opposed to a problem with the printer – although everything else was working fine. Thankfully, there was no problem when using Ethernet or a direct USB connection.

The Epson AcuLaser CX17WF is certainly a good printer – one of the better ones we've tested in this group. The print quality is good, it's reasonably quick, and the toner is cheap if you use the premium brand. The initial cost is a little higher than the other printers on test, at £370, but it's a capable workgroup and multi-user printer.

Brother HL-3170CDW

We thought the Brother HL-3170CDW had the best combination of connectivity, price, replacement toner cost per page and quality. We also liked the economical, low wattage running, which contributes to what is an all-round good investment.

Lexmark CS310N

Although the Lexmark CS310n does have a higher running cost, the initial spend of £85 makes it a pretty good buy for a colour laser printer.

Provided you don't try to print off the internet, then you should be good for a while with a set of genuine toners.

How We Tested

Each printer was tested with a selection of 20 full pages of text and 20 full colour photos and blocks of colours. We used all connections where possible, as well as printing from the cloud and apps, using phones, tablets and PCs.

	Lexmark CS310n	HP CP1025	Dell C1765nfw	Samsung CLP-360	Brother HL-3170CDW	Epson AcuLaser CX17WF
Price	£84.99	£112	£150	£136	£152	£370
Technology	Laser	Laser	LED	Laser	LED	Laser
Dimensions	291 x 442 x 407mm	399 x 402 x 251mm	410 x 379 x 338mm	382 x 309 x 210mm	410 x 465 x 240mm	410 x 389 x 338mm
Weight	20.1kg	12.1kg	15.5kg	9.85kg	18.1kg	15kg
Connectivity	USB, Ethernet	USB	USB, Ethernet, wi-fi	USB	USB, Ethernet, wi-fi	USB, Ethernet, wi-fi
Genuine Toner Cost (Multi-pack)	£282	£120.62	£183.55	£97.16	£143.90	£155.84
Premium Toner Cost (Multi-pack)	£132	£79.86	£55.07	None found	£124.19	£46.75
PPP Costs Genuine	2.1 pence	2.9 pence	3 pence	2.2 pence	2.1 pence	2.5 pence
PPP Costs Premium	3.3 pence	1.9 pence	0.9 pence	N/A	1.4 pence	0.7 pence

Your Letters

Why I Use Windows

As an enthusiastic sometime user of Linux I have been enjoying the current 'Why I Like Linux' thread running through the letters pages. However, I do feel that the answers have reinforced yet again the reasons why Linux has so little real success in attracting a mass market for desktop/laptop use. Virtually all of the correspondents have bemoaned perceived shortcomings of Windows, and described how they loaded Linux onto their PC.

Firstly and foremost – if you have to load it as a separate activity (to me, I might add, a fun one) you've lost most potential users: they want to open the box, plug it in and go. For this you buy a Windows PC (or, if you have a lot of spare cash, a Mac)! When major retailers start selling Linux based PCs with installed tools then Linux will be mainstream.

Secondly, most of the perceived shortcoming are at best half truths and often downright wrong. Just as an example let's consider a point made by Dave Hansford in Issue 1358:

He casually dismissed Windows shell scripting against using Bash under Linux, by comparing its use with batch files: he's 18 years out of date as Windows Script Host has been available since 1997 and been built into all versions of Windows since Windows 2000. It is now augmented/replaced by Powershell.

Indeed if he wanted he could easily be using the full range of unix style scripting tools such as Bash, SED, Auk etc. under Windows if he cared to install them.

And as for John Smith in the same issue: I'm sitting here happily using my sidebar under Windows 8 as I do on my Windows 7 laptop. It's not permanently there, because I don't wish it to be not because it can't be.

Granted, putting a file or a folder on the bar is a two-stage process, but a very simple one. I must admit that I also don't see the great advantage John ascribes to the facility, but that's probably just personal preference.

All in all, I use Windows predominantly since that's what the people I interact with use and it's simpler: still love playing with Linux though..

Dick Pearson

Linux

Microsoft Windows Me Millenium Edition

What Was Wrong With ME?

I just know that this will appear strange, and I really don't want to start a flame war, but.....

What was wrong with Windows ME?Whenever it is mentioned in your excellent publication, I get the impression that your writers are looking round for the nearest spittoon.

Why?

I used this OS for several years as a medium-to-low level user (a little light web browsing, e-mails and so on, and a fairly light use of MS Works – as I couldn't afford MS Office.) In all that time I had no issues with the OS. At one point I actually had to Google the phrase to find out what "BSoD" actually meant. I never, ever experienced it.

So what was so terrible about it?

Please limit your answer to a reasonable number of paragraphs and avoid the phrase "Where should I start?" as this would not be really helpful. Perhaps I should add that I have no interest financial or otherwise in Microsoft.

John Todd

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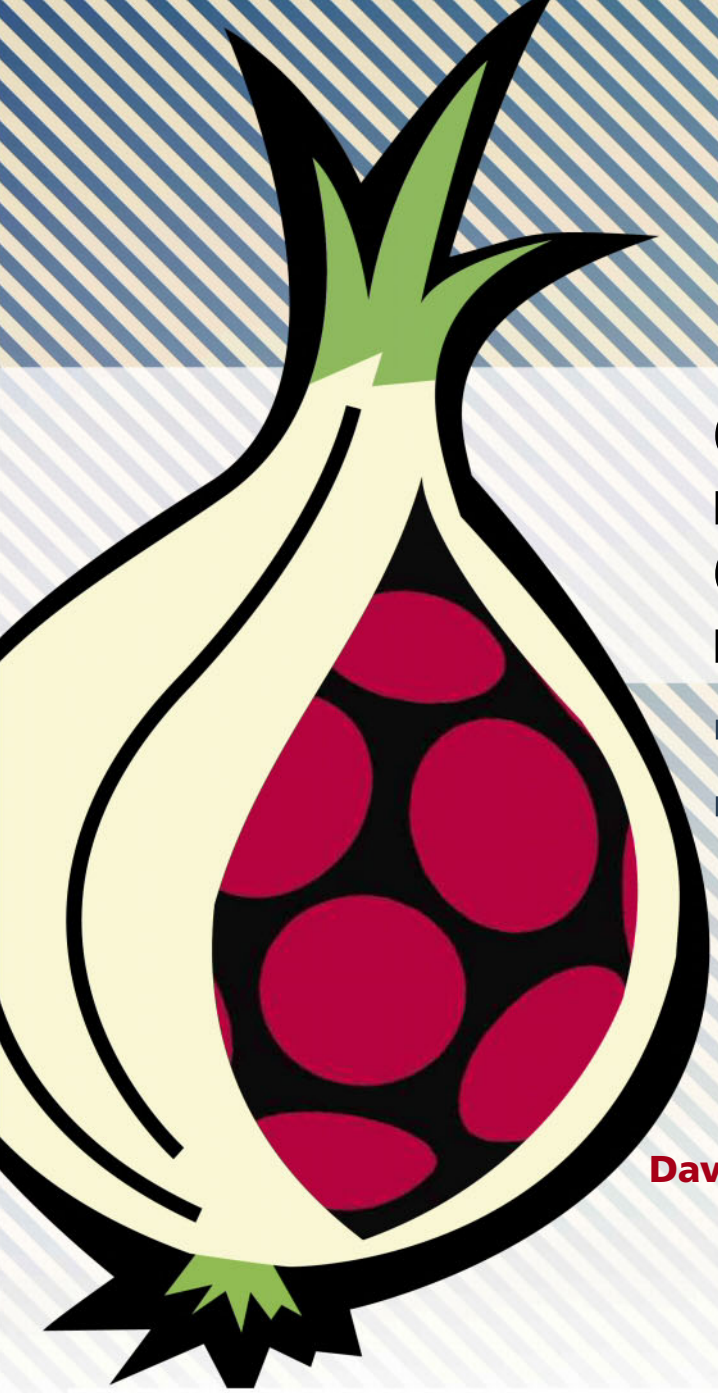


STEP BY STEP: RASPBERRY PI VPN WEB PROXY

David Hayward sets up a safer surfing solution

We're all aware these days of the fact that our, and other, governments (and certain 'agencies') are spying on and monitoring our online behaviour. They do this under the guise of looking out for potential terrorists or spotting violent behaviour of some other kind. If this was the only reason, then fair enough, but there's also that niggling voice in the back our minds that questions the motives of the powerful. What are they really up to? Why gather all that data about us?

We all know at least one conspiracy theorist, and if you ask them about the subject I'm sure they'll offer up all manner of explanations as to why the Bilderberg Group, MJ-12 or the Illuminati are so intent on knowing when we visited Facebook or took a sneaky look at the latest leaked documents online.

Let's face it, though, if the ultra-powerful did want to know your every move, they would have assigned a satellite and a squad of impressively trained individuals to document your every move. So there's little we can do about that, unless you have the abilities of James Bond or Jason Bourne. However, if you do want to make a stand and attempt to stop the lower levels of government agencies spying on your digital life, then maybe you should consider hiding behind a virtual private network.

A VPN will essentially mask your activity and report you as being located in a different country by forwarding all your internet requests through the VPN company's servers. An added bonus to this is if you use a VPN who resides in a different country, which isn't subjected to the laws of our own where they must hand over a traffic log of your internet browsing history. It's a bit more complex than that in reality, but you get the gist of what a VPN does.

We can install a VPN or set one up on our PCs in a variety of ways. Usually you'll sign up for an account and you'll get all sorts of special access along with certain privileges that are better than the free VPN options available. Most of us will already have our favourite VPN providers – ours is CyberGhost and, as such, is who we'll be dealing with in this particular project.

Also, when you use a VPN on your PC you're using it for that instance on that individual machine. But what if you wanted all your connected PCs to access the internet through a VPN?

There are a number of ways, most modern routers allow this feature now, but we thought we'd try something a little different and use a spare Raspberry Pi as a web proxy device that will filter all traffic sent to it through our CyberGhost VPN account. Sound interesting? Then read on.

Step 1

I'm going to assume you have the list of ingredients as listed in the 'What's Needed' boxout. It doesn't have to be exactly what I'm using here, as long as they are close enough then the project should work. I'm also going to assume that you have assigned the Raspberry Pi with a static IP address on your network. I won't go into how to do that in this instance (plenty of online tutorials will walk you through the process). The first step is to make sure that the Raspberry Pi is updated. To check, simply drop into a Terminal command line instance and enter:

sudo apt-get update && sudo apt-get upgrade

Press enter and let the Pi do its thing answering 'Y' to any questions that may pop up. Next, you'll need to install the Open VPN packages to get CyberGhost working with the Raspberry Pi OS and our web proxy software. To do this, enter the following pressing 'Y' to accept the installation:

sudo apt-get install openvpn openssl openresolv

This won't take too long, and there's no need to reboot.

Step 2

Once that's done (it may take a while) you'll need to install a web proxy. I'm using the extremely easy to configure and use Privoxy – a non-caching web proxy that has a number of filtering features and can be used to control access and remove adverts. To install it, enter:

sudo apt-get install privoxy

Enter 'Y' to complete the installation. Privoxy will listen by default for any connections using the address of the Raspberry Pi and the port 8118. So by default, in the /etc/privoxy/config file, it's set to localhost:8118. You may find that it won't work to begin with, though, in which case we have to initiate some fixes.

Step 3

The first thing we need to do is disable ipv6 in sysctl. This will fix the 'cannot find proxy' issues that plagued us when connecting to the Raspberry Pi from another machine. Open up a Terminal and enter:

sudo nano /etc/sysctl.conf

And press Enter. With the sysctl.conf file open, scroll down to the bottom and add the following line, as per the screen shot:

net.ipv6.conf.all.disable_ipv6 = 1

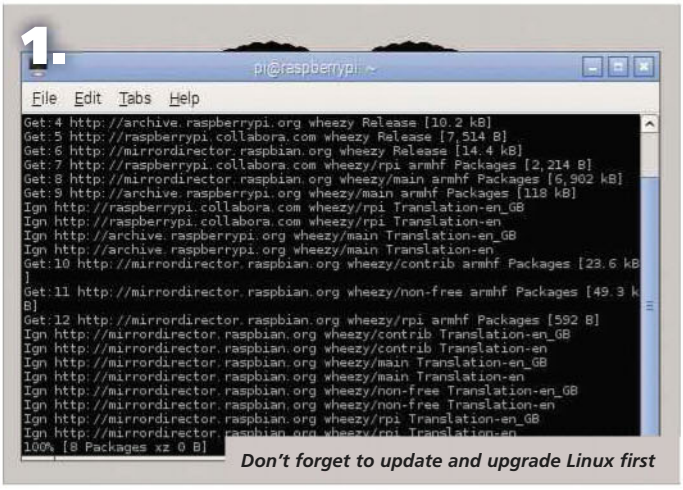
Press CTRL and X, then Y, and press Enter a couple of times to save the changes and exit from nano. Next you'll need to change the reference to localhost in the privoxy config file to the actual IP address of the Raspberry Pi. In our case this was 192.168.1.162. To do this, enter:

sudo nano /etc/privoxy/config

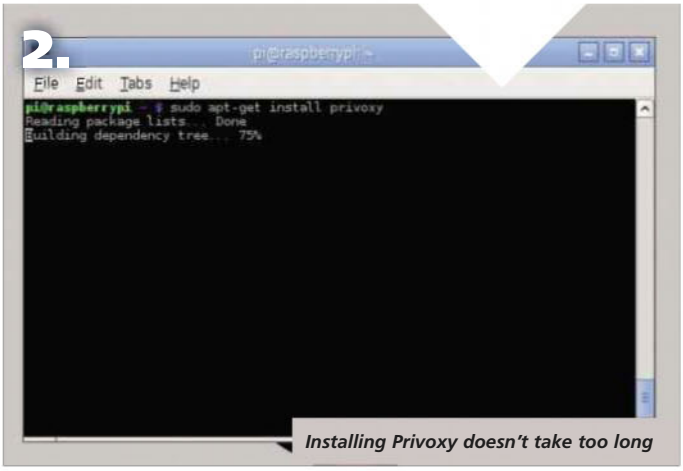
After pressing Enter, go down to section 4.1 and alter the Listen-Address:

listen-address 192.168.1.162:8118

Obviously, you should change the IP address we used here to your own. With that done, reboot the Raspberry Pi.

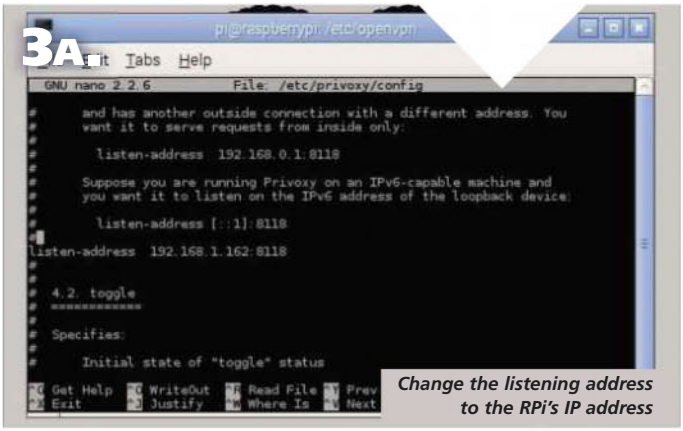


Don't forget to update and upgrade Linux first



Installing Privoxy doesn't take too long

Disabling IPv6 stops proxy errors from other PCs



Change the listening address to the RPi's IP address

Step 4

When the Raspberry Pi's gone through it's reboot cycle, you can test the web proxy connection by entering its proxy address into a browser on another PC. With luck, you'll be able to access the internet as if it was connected to the router as per normal.

Thus, with the web proxy side of things out the way, we can now turn our attentions to the CyberGhost portion. With this, I'm assuming that you'll be using a CyberGhost account. If you haven't got one, then I'd highly recommend it; if you use another VPN then, generally, the same rules will apply but you'll need to consult as to its method of setting up a connection on a Linux based system.

If you have CyberGhost, though, start by logging into the web account page. Click on My Devices at the top of the page and when the new page opens, click on the Other Devices 'Tux' icon, and from the drop-down boxes below the various icons, choose the following:

Protocol: OpenVPN (UDP)
Operating System: Linux
Country: Germany

We chose Germany to prove that the web proxy, and anything running through it, will have a different IP and location to the PC that isn't accessing the internet through the Pi. You can choose your own – but be aware that, should you want to change the country, you'll need to go through this step and the next to obtain a new set of configuration files.

Step 5

Scroll down and you'll see a Download Configuration button, click this and you'll initiate the download of a zip file containing all the necessary components to access CyberGhost. Unpack the files and rename the openvpn.ovpn file to CyberGhost.conf. Next, copy the files to the openvpn folder by entering a Terminal and tpying:

cd Downloads [assuming this is where the zip file is]
sudo cp CyberGhost.conf /etc/openvpn/
sudo cp ca.crt /etc/openvpn/
sudo cp client.crt /etc/openvpn/
sudo cp client.key /etc/openvpn/
cd /etc/openvpn

Step 6

The last command in that sequence changed the directory to the openvpn, where the files have just been copied to. In here, you'll need to create a new text file that contains your CyberGhost username and password. Simply enter:

sudo nano user.txt

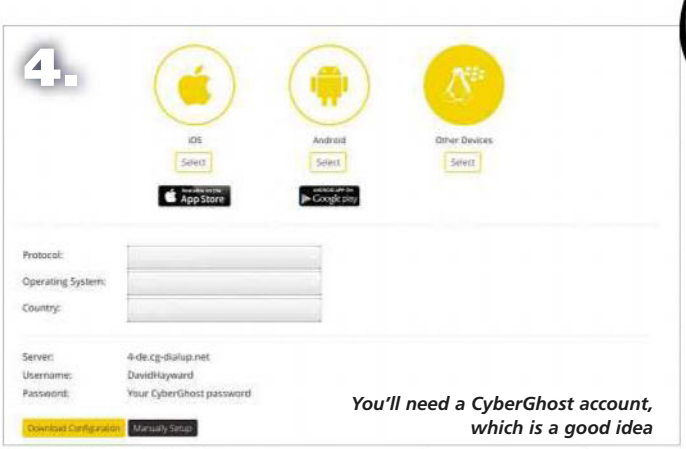
And in the opened text file type out your username and password as:

Username
Password

Save and exit from nano, then enter:

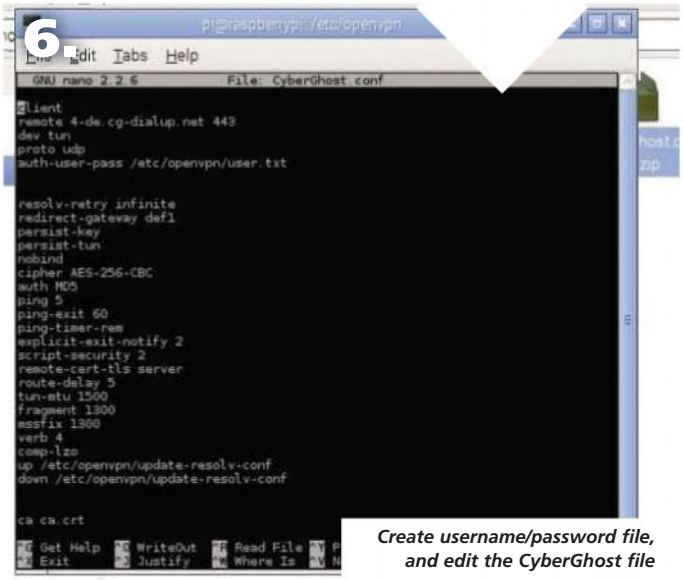
sudo nano CyberGhost.conf

This is the configuration file for accessing CyberGhost and combining all the other files you copied over, so everything will work, naturally. With this new file open, add the following to the auth-user-pass line:

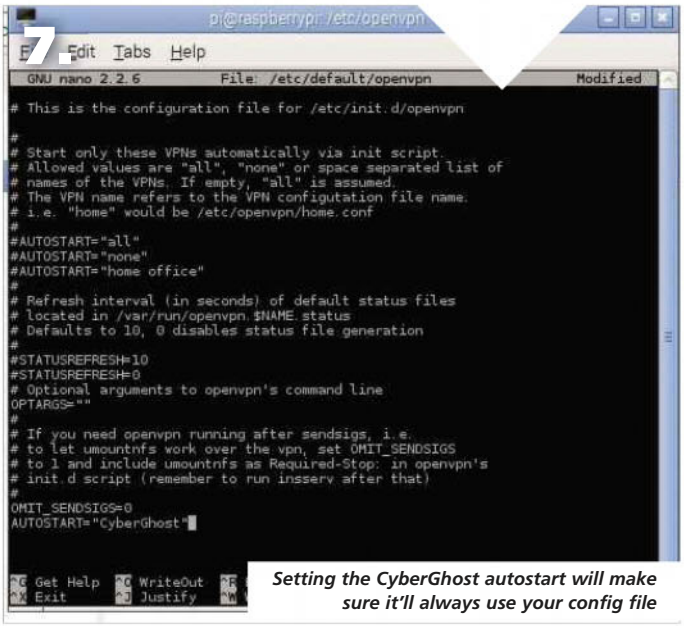


You'll need a CyberGhost account, which is a good idea

Rename and copy the downloaded files to the OpenVPN folder



Create username/password file, and edit the CyberGhost file



Setting the CyberGhost autostart will make sure it'll always use your config file

Ingredients

The list of what you'll need is as follows:

- A Raspberry Pi, doesn't matter what version as long as it has the latest Raspbian installed
- A CyberGhost account or at least an account or access to a free suitable VPN provider
- Another PC to test the web proxy access with
- A network point where you can leave the Raspberry Pi once it's configured

/etc/openvpn/user.txt

The entire line should now read:

auth-user-pass /etc/openvpn/user.txt

Now scroll down to the bottom of the next section of values, and at the bottom of that – under the comp-lzo line – enter:

up /etc/openvpn/update-resolv-conf
down /etc/openvpn/update-resolv-conf

Save and exit from nano.

Step 7

Still in the same Terminal instance, enter the following:

sudo nano /etc/default/openvpn

And add the following line to the bottom of the file:

AUTOSTART="CyberGhost"

This will enable the CyberGhost.conf file to auto load every time OpenVPN is launched. Save the file and exit nano, then when back at the command line enter:

sudo update-rc.d openvpn enable
sudo service openvpn start

With luck the Raspberry Pi is now being routed through the German (or whatever country you decided on) VPN server.

Step 8

The final step is to test that everything is working okay. All you need to do is, from another PC on your network, open up a browser – I'll use Chrome in this instance – and edit the network preferences to pass any traffic through to the web proxy on the Raspberry Pi.

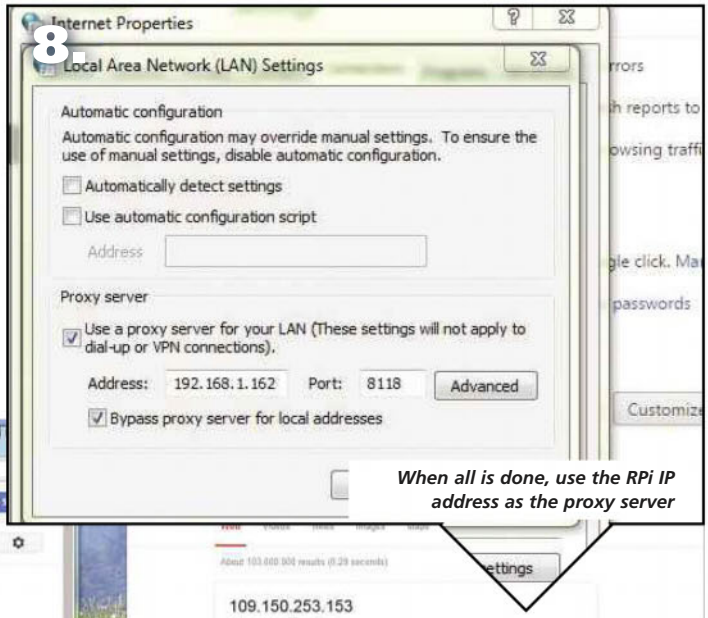
In this case, the Raspberry Pi Privoxy is on 192.168.1.162:8118, so the Proxy Server box is filled in accordingly.

If you did everything correctly, then with luck if you Google your current IP address you should get a completely different IP and country of origin from that of the same PC using a different browser that hasn't been configured to use the new proxy system settings.

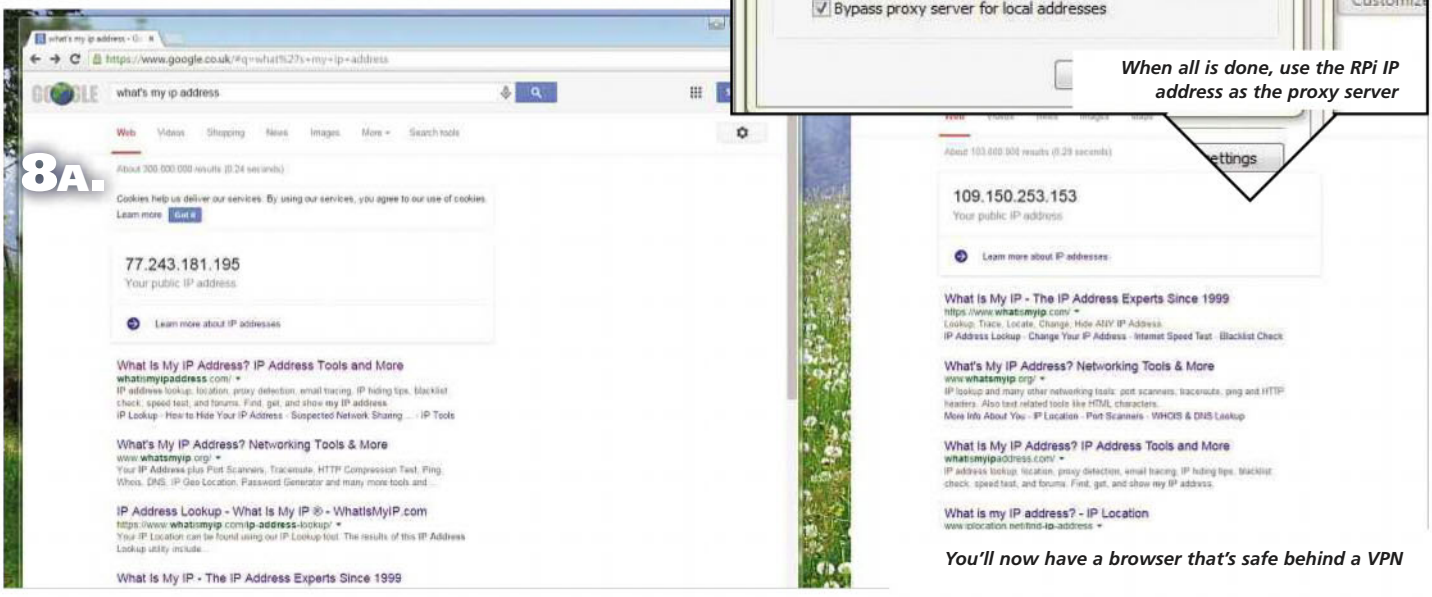
If you need extra proof, you can query the IP address location from a Google search.

Conclusion

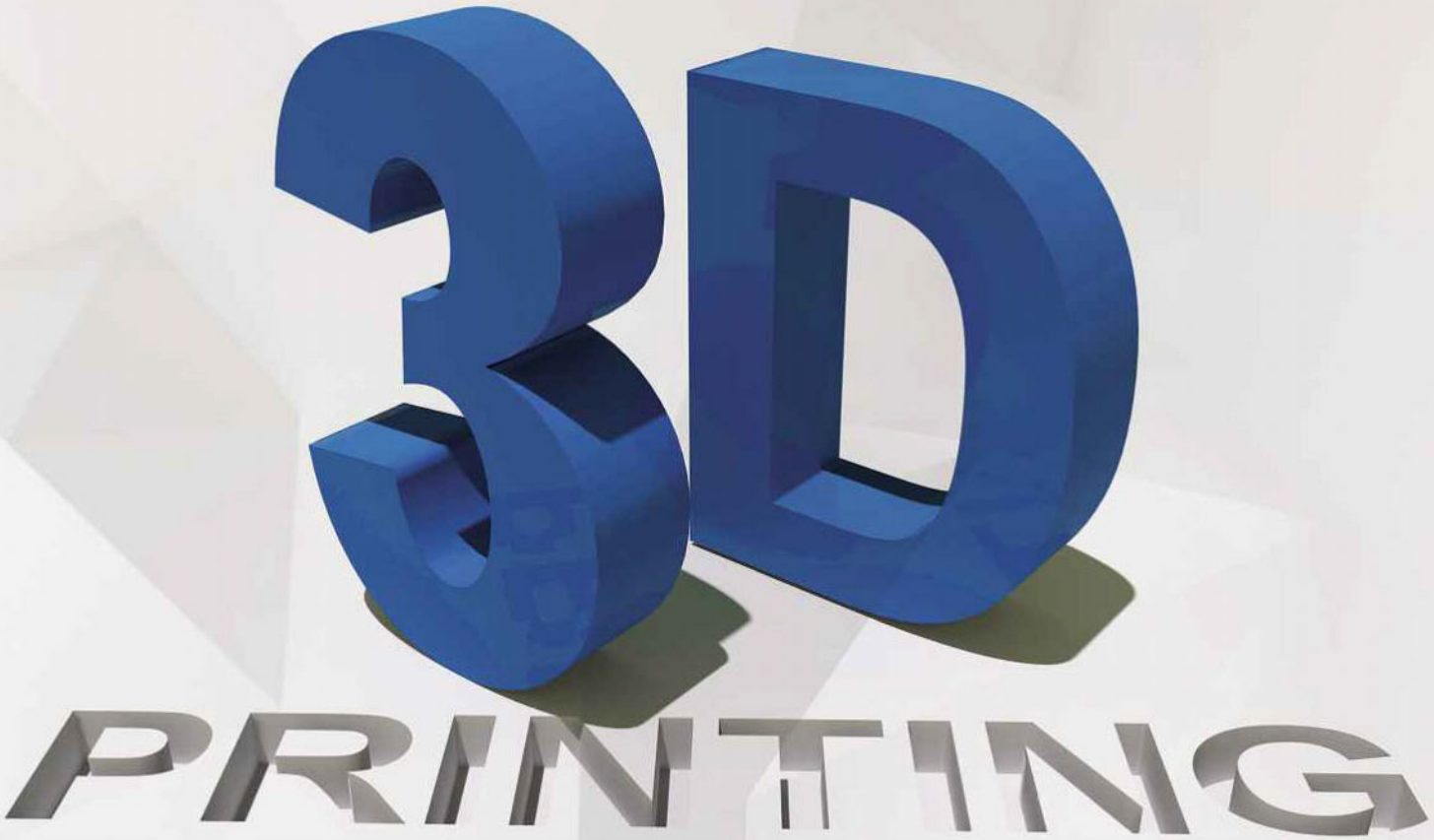
Now you should be able to access content from other countries, and stay safely hidden from the prying eye of the watchers. All you need to do is point the browser to the Raspberry Pi address. mm



When all is done, use the RPi IP address as the proxy server



You'll now have a browser that's safe behind a VPN



Dreams Unrealised

Mark Pickavance looks at the world of 3D printing and wonders why we don't all own one of these amazing machines?

A few years ago, I saw my first demonstration of a 3D printer and told everyone that I knew that this was most certainly the 'next big thing'.

I'm still excited about the technology and the possibilities, but for numerous reasons, 3D printing just hasn't gone mainstream in the way I thought it would.

Is the dream of a 3D printer in every home dead, or is it just waiting for something special to happen that will elevate it from geek gadget status?

An Important Question

When I sat down to think about this subject, I was struck by one critical fact that I couldn't ignore: I don't own a 3D printer. I also don't own a Learjet or a Rolex watch, even a copy, so surely that isn't anything shocking, is it? No, it's not, but given how enthusiastic I was about the concept of 3D printers, that years later I don't own one is somewhat telling.

Self-interrogation revealed that three things stood between me and owning one of these devices, and these are:

- Cost
- Maturity of the technology
- Justification

What's interesting about the first part is that I actually first encountered a 3D printer some 25 years ago working in the automotive industry, using a technology called stereolithography. This expensive equipment took inordinate amounts of time to make rather brittle plastic prototype parts to use in cars.

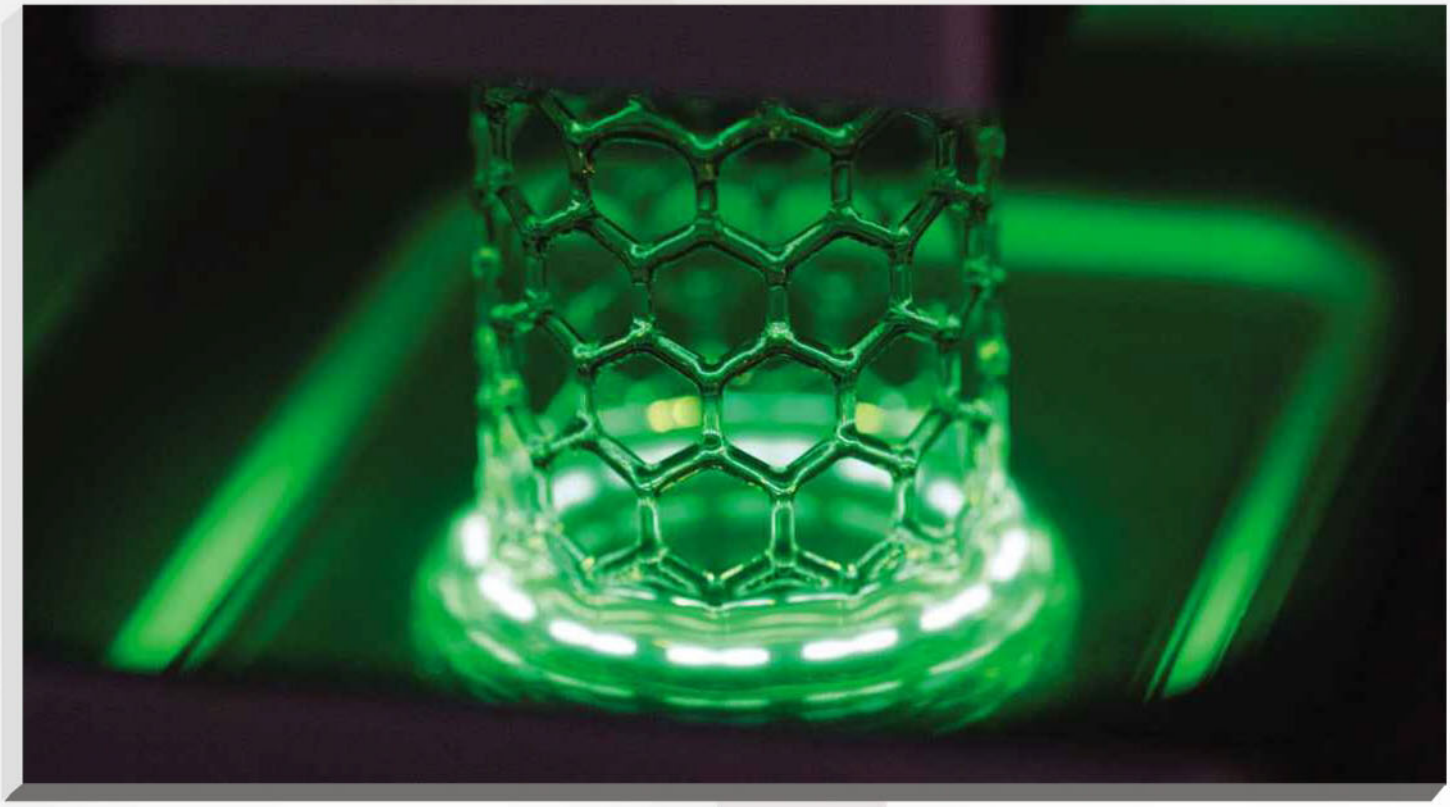
It was also rather large and needed an expensive service contract to keep operational. Surely things are more realistic now?

Costs

3D printers are less expensive these days, but not to the point where everyone can afford one. There are self-build solutions and rather Heath-Robinson devices that are less than £1,000, like the Velleman K8200, which sells for about £600. But when you start looking into these they all print at relatively low resolution, usually between 0.2mm or even 0.25mm. That's not a very smooth object, and spending over £1,000 only usually gets you to 0.15mm and £2,000 to 0.1mm.

In addition to the quality price curve there is also another that balances the size of the object you can print against the cost and the time taken to produce.

And, without exception, all these printers use extrusion technology, and those that make professional



3D printed parts use a granular method (sintering) or a powder bed method. Neither of these techniques is affordable for home use, yet, and the even more exotic ones like the aforementioned stereolithography or electron bean freeform fabrication aren't likely to be in the near future.

That leaves extrusion, probably the least effective means of 3D printing, as one of the few options for home use. Yet to get good quality and speed, even this is too pricey for general home use, and I've not even mentioned the cost of materials and power that goes into making relatively simple items.

Not every 3D print comes out perfectly, as this example well demonstrates

Maturity Of The Technology

Writing for any technology magazine, the question that I get asked the most is the classic one about buying now or waiting for something better. I'm sure I could write a paper on the psychology of delayed gratification, but many people quite reasonably choose not to buy something now to get something better at a later date.

With the speed that technology now moves at, that makes plenty of sense, though taken to its extreme you'd never buy anything technological ever again.

The tipping point is usually when the next generation will be better, but not so much that it is worth not investing now. A good example would be someone interested in an Apple iPhone, the next version of which is very likely to be only marginally better than the one they currently sell or the one they previously sold.

With very incremental changes, it's easier to make those choices because, other than bragging rights, the differences between each release are modest.

But that's not where 3D printers are right now. They're on a very steep development curve where big jumps in quality, speed and cost are potentially just around the corner. In that scenario, sitting on your hands makes more sense because spending big on a printer that's entirely obsolete only months later would be annoying.

> **Whenever 3D printers appear on the news or a documentary channel, they're generally being used by experts**

But it isn't that 3D printers are getting better; a whole slew of new technologies are coming along that are adding whole new methods, one of which might make the era of extruding ABS plastic seem as arcane as making parachutes with actual silk.

One of these is certainly continuous liquid interface production (CLIP), a technique that US company Carbon3D demonstrated recently. Instead of forming an object in fine layers, CLIP grows objects in a pool of resin using UV light to polymerise the liquid and oxygen to inhibit the reaction.

The advantage of this method is that it is, even at this stage of its development, between 25 and 100 times quicker than extrusion and powder methods. Objects emerge in minutes, not hours, are of high quality, and the objects don't suffer with thermal distortions or inconsistent mechanical rigidity.

In many respects this sounds like the nirvana of 3D printing, and Carbon 3D has attracted substantial amounts of investment since these announcements in March, but a commercial product seems some way off yet.

In the meantime, there are hundreds of other people all over the globe looking at means to make other new methods or enhance existing ones. So in terms of maturity, 3D printing is still at the toddling stages, and therefore big investments in time and cash may well be premature.

And then, there is the justification for that level of investment to consider.

Justifications

Whenever 3D printers appear on the news or a documentary channel, they're generally being used by experts in a lab working on spacecraft parts or to build an amazingly expensive F1 car. That sends the message to those who aren't tuned to the technology world that 3D printing isn't something that most people could use or, most pointedly, have a use for.

But that's the wrong impression, created by documentary makers, who are trying to push the line that the technology in use is 'cutting edge' and wouldn't be understood by Joe Public. What the majority of people don't realise is that a 3D printer can make a replacement handle for a fridge just as easily as it can prototype an F1 body part, as it's uninterested in the complexity of how the shape was originated.

If you stopped using the phrase '3D printer' and told people you had a box that could take any broken plastic part and replicate it whole again, then they'd be interested.

Okay, they might be less interested when they saw the price, but generally people like the idea of fixing broken things, even if actually doing it proves to be too much of a challenge for many.

3D printers offer that possibility, though at this time, they're not public friendly in respect of either cost or the complexity of operation. To operate one you need to be computer literate, understand 3D modelling, and also realise the technical limitations of the printer you have.

But none of those things are a problem for me, so why am I not on this bandwagon? It comes down to justification, because spending more than £1,000 on something I occasionally use to make replacement parts isn't something I could easily defend.

If I'm honest, what I'd really like to do is use one to fabricate super-detailed replacement parts for plastic

The FormLabs Form 1+ is a new generation of 3D printers that can produce high-quality parts using stereolithography and liquid resin. It costs about €3,399 and can make parts up to 125 × 125 × 165 mm. With a layer thickness of 25 microns possible, this can make very detailed parts, though it's not cheap enough for most home users to consider

model kits, which I loved making as a child. But that doesn't cross the justification line either, not least at this stage of my life, when I just don't have the time for those hobbies.

For the economics of this to work, I'd need to have something to do that would either take me an inordinate amount of time to do without the 3D printer or just couldn't be done otherwise. And sadly, that's not a situation I've so far run into.

I won't say I'll never have an excuse to have one, and as the technology gets better and cheaper, the justification gets easier, but I'm not at that point right now.

Those are my subjective reasons for not owning one, but there are other problems that people are finding beyond these that are more to do with the general air of negativity that has surrounded 3D printing from the outset.

Legalities

Very early on, when 3D printers first became a story, lots of people got very agitated about the legalities of using them to either recreate or redesign products that companies spent millions developing. But actually it was more complex than that, because using a 3D printer, it is potentially possible to infringe copyrights, patents and even trademarks.

For example, if you designed some sculptures of Mickey Mouse, then Disney wouldn't be too thrilled even if technically the character might soon be out of copyright, but he's still a registered trademark and will be indefinitely.

But equally, any patent or copyright dispute will often focus on the financial losses of the rights holder, so making a one-off-copy of something, like the film industry does all the time to destroy it in a movie, isn't likely to bring the legal system down on your head. Well, you'd like to think that, but the reality is stranger.

Disney famously demanded that paintings of its characters be removed from three Florida daycare centres for young children, citing trademark infringement. The three complied and very kindly Universal Pictures paid for the repaint, replacing Disney characters with some trademarked to its own company.

Some companies, like the one I just mentioned, protect their rights to silly extents, but others only get really interested when you start making money. And in that situation, does Disney, for example, go after the person using the 3D printer, the maker of the printer, the supplier of the material or the point of sale (eBay, for example).

At this time, the usual method is to approach the maker and selling location and ask that the product be withdrawn because it infringes copyright. Equally, those selling the items can protect themselves to some degree by promising to immediately withdraw items that might infringe if the copyright holder asks them to do so. That way, they're not encouraging people to infringe the law, even if they're not actively discouraging it either.

Early on in the development of these machines, there was some talk that perhaps they should all be licensed and then pass their data to some central arbiter, where it would be checked for infringement. Apart from the total impracticality of that, and how small adaptations would make it non-infringing, some in the intellectual property game still seem to think that such a magic wand might exist, in some universe.

Potential legal ramification put some people off, and others didn't want to be labelled as potential terrorists.

Gun Control

Many non-technical people have argued strongly for control of 3D printers after the media started circulating scare stories about how they could be used to create

firearms. The fine irony that most of these stories originated in a country where the number of handguns in circulation almost exceeds the population wasn't lost on me. What they generally failed to mention was that at this point you can't practically 3D print ammunition, that the design in question would only fire once, and that it was massively inaccurate and significantly less powerful than if the same ammo was fired from an actual gun.

From my own experience with firearms, and some never-to-be-repeated experiments I did some 40 years ago, I've made a more effective gun from a block of wood and a nail than the 3D-printed one that appeared on numerous news broadcasts.

It was sensationalist and entirely missed the point that gun makers themselves have been making really effective prototype weapons using sintering techniques since the 70s. Nevertheless, the idea that 3D printers would likely be owned by those wishing to create nefarious devices was pushed hard, even if it had little or no solid basis in fact.

With the right knowledge, it is possible to create poison gas from household cleaning materials, and explosives from gardening products, but I don't see anyone serious about banning either of those common substances.

It's true that eventually home owned 3D printers will be able to reach a level of sophistication that professional equipment reached decades ago, where making functional firearms is entirely practical, but at this time, you can buy real automatic weapon in numerous gun bazaars around the world for only a few dollars, so why would you bother? This is yet another connection that has been made between these devices and those breaking or intent on breaking the law that doesn't help their cause.

Cheaper Alternatives

Many of us own colour printers, but often we don't use them to print our holiday snaps, because of the cost. Instead we send or take the digital files to a photo print booth, where they're printed for us professionally. Not only does this take less time than printing hundreds of pictures at home, it's also much, much cheaper, probably by an order of magnitude. We still might print the occasional large photo for a frame or for a visiting aunt, but this example points out that having a facility doesn't always dictate that you use it.

3D printing has its cheaper options too, with 3D printing bureaus cropping up that will accept your model data in a range of formats and then output the object in the material you require quickly and efficiently.

The equipment that these companies operate costs tens of thousands to buy and plenty to operate, so they can do things that home 3D printing practically can't. They can also offer facilities, like converting the object into solid metal, that are beyond the home user. That takes 3D printing from something mostly promoted for prototyping into custom parts for limited volume productions.

“3D printers are less expensive these days, but not to the point where everyone can afford one”

For someone producing the occasional part, the economics of this are that the parts can be made more quickly, in a greater range of materials, at higher quality levels but at a higher individual cost. But when you factor in that there is no investment needed, and all the maintenance problems aren't yours, it still looks very attractive. This is especially true if the parts are being made for a business client, as the 3D print costs can be passed on to them.

It could be argued that the ideal situation is the same one as I outlined with the printer, where you

Getting good quality might be about longer print times, or it might require a much better printer to achieve the finish you're looking for

have a general purpose machine for ad hoc tests and immediate jobs, but the finished items are all sent for better quality rendering.

However, if the cost of having objects rendered as a service drops and the speeds are fast enough for a quick turnaround, then that could undermine the need for a personal solution entirely.

Final Thoughts

There are two potential arguments as to why 3D printing hasn't taken off, and I'm not actually sure which one I'm really convinced by.

One is that it will never actually become a widespread thing, because not everyone is both technically minded and creative. Alternatively, it will expand rapidly once the devices are cheaper, the methods slicker and the output more useful.

Supporting the view that it won't become an appliance in every home is that there are some really useful pieces of equipment that most homes don't have for a variety of reasons. A typical example of this would be the lathe, a technology that the ancient Egyptians understood could be very useful more than 4,000 years ago. But it became a precision tool during the industrial revolution, and these days anyone wanting to work wood or metal in cylindrical shapes will use one. However, of all my friends, I only know one that owns and has the skills to use a lathe, and for most people it isn't ever a device that they'd ever invest in personally owning.

While the 3D printer has a wider application, it does require some skills to operate, much like a lathe, though I'll admit that a 3D printer is probably less dangerous should something go wrong.

That's one end of the spectrum, where 3D printers will only end up in very few people's hands, which will not make them cheap or especially accessible.

However, the very good counter argument to that view is presented by the printer, because before desktop publishing, if you wanted high-quality printed material, you'd need a professional printer. No individual would understand the technicalities of typesetting or own the very expensive equipment needed to output even single-colour printed copy.

And then Pagemaker came along on the Mac, and laser printers and inkjet printers, and suddenly everyone is a full-blown print house. In just ten years, print went from being the exclusive preserve of those in the business to something almost anyone could achieve in their own homes, and almost every person that owns a PC has a printer, almost without exception. We now take for granted that if we need low-volume printed material, it's a job many of us can do, and printers are only required for either high volume, very high quality or specialist jobs like A0 posters.

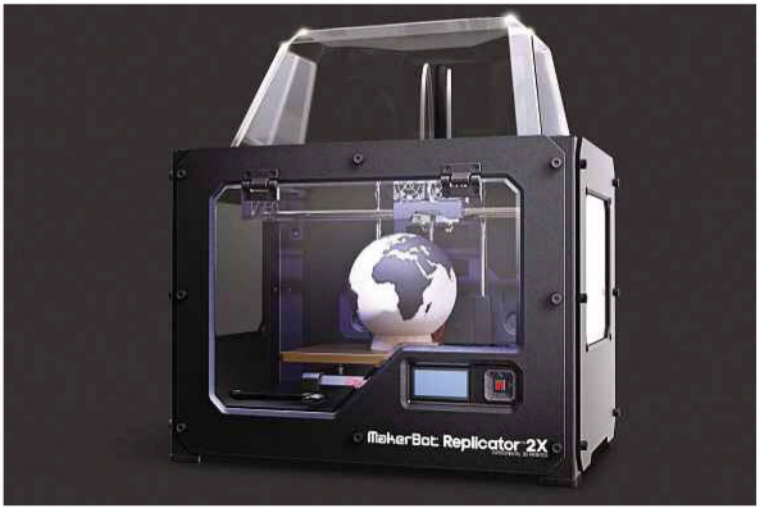
The lathe is one extreme, and the printer is the other, and there is no rule that dictates that the 3D printer needs to be at either point; it could be something between them.

Given that it seems to be having something of a difficult gestation, it probably isn't going to have the global spread of the ink/toner printer, but equally I don't see it as being as exclusive or as specialist as the lathe. With the right software and printing method it could be much more useful and require less skill to operate, splitting these technology examples.

It may also be that, very much like the tablet computer, it will be something that doesn't fly at the first attempt but needs more than one go to get fully airborne.

Even without the explosion of use that I was genuinely expecting, I still think 3D printers will have their age. It just might not be as soon as I thought. **mm**

Makerbot Layoffs



As if to underline that not everything is roses in the 3D printing garden right now, printer maker Makerbot just announced that it was downsizing its workforce by 20%.

The Brooklyn-based operation became a wholly owned subsidiary of the printing behemoth Stratasys, Inc. in 2013, when it was bought for $403m. A new CEO, Jonathan Jaglom, was recently appointed from Stratasys, so restructuring of the operation was expected to follow.

Along with firing some 100 or so staff, it also announced that it was closing off three of the company's retail properties. The official statement read:

"Today, we at MakerBot are reorganising our business in order to focus on what matters most to our customers. As part of this, we have implemented expense reductions, downsized our staff and closed our three MakerBot retail locations.

"With these changes, we will focus our efforts on improving and iterating our products, growing our 3D ecosystem, shifting our retail focus to our national partners and expanding our efforts in the professional and education markets."

That Makerbot, probably the best known name in personal 3D printing, isn't expanding but is contracting is a concern. It hints that the market for these devices among the technically minded might be reaching saturation point and that a wider market appeal is needed for growth to continue.

Remembering...
ZX Spectrum

David Hayward goes all mushy over his favourite computer ever

A week or so ago, on St George's day, there was another celebration taking place among the retro computing fanatics. That was of course, the thirty third birthday of the ever wonderful ZX Spectrum.

Indeed, 33 years old. That amazing little rubber, 'dead flesh', keyboard machine with its 48K of memory, seven colours with two brightness levels including black, and an image resolution of just 256 x 192. It was quite extraordinary.

What's more extraordinary, though, is the fact that despite its limited hardware, the games that were produced were by far some of the most playable and exceptionally imaginative titles we've ever come across. And all within a mere 48K. This Word document I'm writing now, at this very point, is 14K and I'm only 130 words in.

Okay, so not all the games and memories of the Spectrum are wonderful, and it did have its bad points, we'll agree on that. But for many of us the Spectrum was our first home computer, and it was cherished and loved by us for many years, until it finally gave up the ghost and was retired to a box in the loft.

Its History

Sinclair Research launched its first computer late in 1979. That was the ZX80, a follow-up to the MK14 kit form computer. The idea of a cheap computer, one that everyone could afford, had been forming in the substantial cranium of Sir Clive for quite some time by then, and the ZX80 was just the first step in the process.

As components dropped in price and the manufacturing processes improved, the ZX80 was soon followed by the cheaper ZX81, which cost roughly £80, and then the familiar ZX Spectrum on 23rd April 1982.

The 16K version was first, costing around £125, then within a few weeks the 48K version became available, for about £175. The prices soon dropped, and by 1983 you could easily pick up a 48K Speccy for less than £100.

The result was a computer that sold by the millions and brought fame and fortune, plus a title, to Sir Clive. Despite its diminutive dimensions, the Spectrum was a giant in the newly emerging digital age. It conquered the market, became one of the most successful computers of all time, was presented to world leaders as a gift by Margaret Thatcher and pretty much kick-started the British computer games industry.

Did You Know...

- The Spectrum was originally going to be called The Rainbow or ZX81 Colour or LC3 (Low Cost Colour Computer) or ZX82.
- It is one of the most cloned computers ever. In fact, according to internet myth, there's still a Spectrum clone in production in Russia.
- The Z80 assembler was written by external consultants and was never documented very well. Sinclair Research therefore heavily relied on an £8 book, *The Complete Spectrum ROM Disassembly*, by Dr Ian Logan and Dr Frank O'Hara, for their work on the Spectrum 128K.
- You could network several Spectrums, at a blistering rate of 100Kbps using the ZX Interface 1.
- There were over 25,000 games written for the Spectrum, and there are still many more being written today.

However, as we know, Sir Clive eventually sold the Spectrum to Sir Alan after the 128K and went on to make things like the C5. Regardless of what he and the company did next, the Spectrum is what 80s computing will be remembered for.

The Good

Where do we start? The games, the programming, the cost… the list goes on.

The Bad

Colour clash, poor sound, overheating, and how on earth did we ever manage to type anything on that keyboard?

Conclusion

The ZX Spectrum was and still is a wonderful little computer. Not only did it give many of us our first taste of computing technology, but it fired the imagination of future gamers, and it provided many hours of pure joy. **mm**

It truly is a thing of beauty

The Spectrum+ looked even more sophisticated

The Things That Frustrate Us About... Digital Assistants

They're supposed to help us use our phones, but they often just seem to get in the way...

If you've got an iPhone, it's Siri. If you're using an Android device, Google Now. And if you're using a Windows phone, it's Cortana. Whichever platform you're using, you've probably been annoyed by these quasi-helpful digital assistants.

The idea behind them is fairly sound. The quickest way to get someone to do something is to ask them, so why shouldn't your phone be the same? Having an interface where you can just speak naturally and have your phone do the hard work of looking up information or performing a simple task like setting a reminder or sending a message seems like an incredibly convenient, science-fiction-style bit of technological magic. In practice, though? They're just annoyances. Here are three common niggles:

Argh! Accidental Summonings

They're designed to be helpful and easy to use, so it's generally pretty simple to call on Siri or Cortana to answer your questions. But sometimes you don't want to. You just meant to open your phone's home screen or type a message, and that little bleepy noise that tells you Siri's awake and listening is only telling you that you now need to close it down again before you can do what you wanted to do in the first place. Instead of making things quicker, everything's taking twice as long.

Fix it: This depends on whether you ever want to use the digital assistant feature. If you don't, you can turn it off in the settings menu so you won't be bothered. Otherwise, hard cheese.

Bah! Bungled Instructions

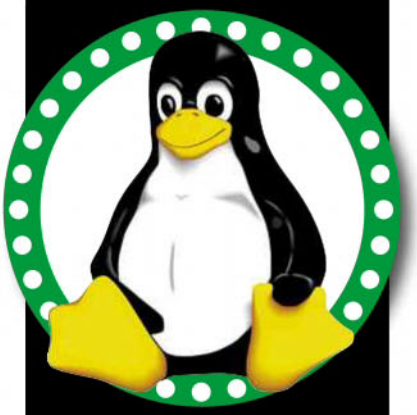
On one hand, it's pretty impressive that we now carry around tiny computers in our pockets that can react when we say things like "Call my mother". On the other hand, the fact that they can do that makes it utterly infuriating when you ask them to do something simple (like "Play Wings by Little Mix") and they try to search the internet for the entire phrase instead. Commands that you know should work sometimes don't or cause something counter-intuitive to happen; the wrong app opens, the wrong person gets called, and an alarm gets set for entirely the wrong time.

Fix it: Mostly this is a case of paying attention. You can 'train' voice-recognition apps like Siri to respond better to your voice, and you can also usually teach them things like which number you mean when you ask to call a relative, but sometimes you just have to accept that computers aren't people – even if they'd like to pretend otherwise.

Grrr... Just Plain Unhelpful

Worse than a misunderstood command, though, are those times when Siri, Cortana or Google Now just claim they can't help. "I'm really sorry about this, but I can't take any requests at the moment" is about the most useless thing your phone can ever say. It's not a person! It can't be too busy! Or too tired! Argh!

Fix it: Okay, often the problem is that you don't have a data signal, so it can't access the internet to process your requests. Try connecting to a wi-fi network or waiting until you have a signal. Other tricks to getting voice-recognition apps to do what they're supposed to include talking faster (counter-intuitively, they tend to understand that better than if you slow down too much) or putting on a more formal accent. You could also try saying please, though it probably won't help. **mm**



Linux Round-up

A collection of Linux news this week

David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

It's been quite a busy week for Linux, so it seems, which makes things a little difficult to single out one item from the many that have so far flopped into my inbox from the far-flung corners of the Linux universe.

To make things a little easier for me and to get across as much info as I can in such a short amount of time, I thought I'd do a quick round-up of news snippets that are worth looking into more.

8 Things To Do...

With Ubuntu 15.04 now available, LinuxandUbuntu.com has put together eight things to do after you've installed the latest version. They include updating, installing a tweak tool, disabling online search, installing the latest graphics drivers and so on.

1 Out Of 5 Games Prefer...

An interesting snippet of news this week, which claims that one in every five games on Steam is now Linux friendly and supported.

This is extremely good news for the Linux gamer as well as the platform as a whole. Gaming platforms are a battleground, where the PC has lost some footing in favour of the new consoles, but with Linux in its arsenal, the PC could once again rise to be the best gaming platform once more – although we already think it is.

Linux 4.1 RC1

Linus Torvalds has posted a message regarding Linux 4.1-rc1, asking users to go forth and test. The majority of the changes here appear to be driver related but with a few features that may appeal to users. As the man said, give it a test.

The MS Money Making Machine

Brian Fagioli, from BetaNews, has written an interesting piece regarding the money made by Microsoft from the sale of Linux-based Android phones and Chromebooks through its catalogue of patents.

Now though, it seems like it's about to make even more thanks to a deal with Qisda Corp. There's a lot going on, but you can catch up with the article at **goo.gl/6qneRM**.

Upgrade Time

The ever helpful LinuxConfig.org has put together a handy walkthrough on how to upgrade a Debian system from Wheezy to the latest Jessie.

If you fancy giving it a go, you'll be able to find the brief tutorial at **goo.gl/9PBlLg**.

10 One-Liners For Linux Admin

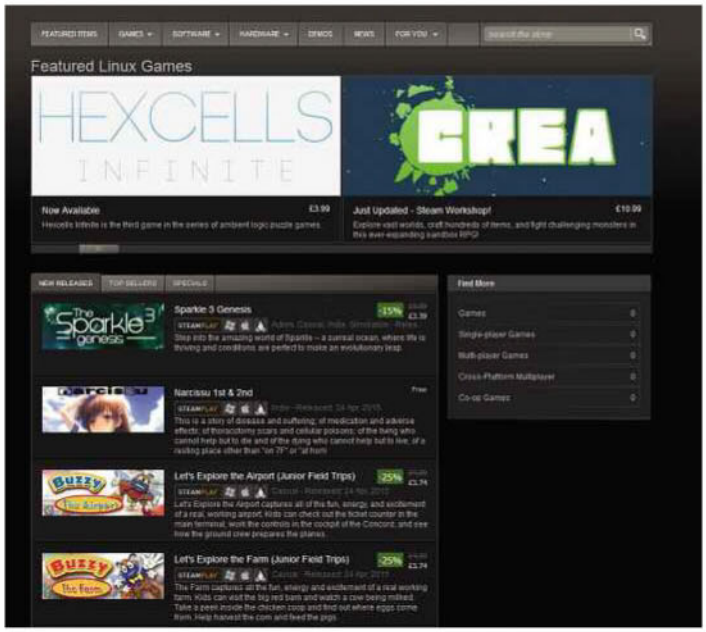
Finally, Aaron Griffith, a Linux tech guru-type chap, has put together a list of his top ten single command line entries that he uses on a regular basis.

The commands range from generating passwords to calculating process sizes and clearing the disk cache to free up memory. It's all interesting stuff and worth noting for future use. Anyway, you can find it on his blog at **goo.gl/7VxI7U**.

More News Than You Can Shake A Linux Stick At

Needless to say, the news items could go on for some pages and include the releases of Ubuntu 15.04, Debian 8, a Stellarium update, LibreOffice 4.3.7 and a news item on scientists using Ubuntu to help interpret data from the Hubble Space Telescope.

It looks like Linux isn't slowing down any time soon, which is the best news any of us can hope for. Until next week, then.



One in five games on Steam is Linux friendly!

Amiga Updates

More from the Amiga sector with Sven Harvey

Sven Harvey has been our Amiga specialist for over 14 years, drawing on his 23 years of retailing computer and video games and even longer writing about them.

Amiga 30 Events

The American anniversary event is at all systems go following the successful completion of its Kickstarter campaign. The event will take place at the Computer History Museum, in Mountain View, California across 25th and 26th July. Key speakers at the event include original Amiga development team members RJ Mical, Carl Sassenrath, Dave Needle and Dale Luck, while further speakers with a later connection to the platform include Trevor Dickinson (A-EON Technology), Colin Proudfoot (Commodore UK) and Mike Battilana (Cloanto – Amiga Forever.) You can find out more by visiting the website at **www.amiga30.com**.

Prior to the event in the USA, however, is another Amiga30 event in Amsterdam. Taking place on 27th June at The Lighthouse IJburg, the guest list includes Dave Haynie (Commodre-Amiga), David Pleasance (Commodore UK), RJ Mical, Carl Sassenrath, Petro Tyschtscennko (Commodore Germany and Amiga Technologies), Mike Dailly (DMA Design), Jon Hare (Sensible Software), Allister Brimble (former Team 17 musician), Trevor Dickinson and Jens Schönfeld (Individual Computers) and others. You can find out more on their website at **www.amiga30.eu**.

Now you might see a pattern here as I point you towards **www.amiga30.co.uk**, which is the online home of our own British Amiga 30th Anniversary event as mentioned in the last Amiga Mart, which is raising money for the BBC's Children in Need appeal. Since writing that article, there has been a guest line-up change. Unfortunately, Martyn Brown (formerly of Team 17) has had to pull out for reasons beyond his control. However, joining the line-up is Michael Battilana, who as the Cloanto/Amiga Forever rep is donating a free copy of Amiga Forever Plus Edition for every attendee. Also joining the event is Bjørn Lynne aka Dr Awesome, who produced many Amiga music MOD files, including the music used on Team 17 games that Allister Brimble's music wasn't. With Bjørn, and Allister present alongside Tim Wright (Psygnosis musician) and Mike Clarke (another Psygnosis musician), there is serious collaborative musical potential. In other news, an afternoon-only ticket is also available for the event, so check out the website above for more information! There will also be a certain writer kicking around, who has been doing the only Amiga column in a mainstream newsstand magazine in the world since 1999, so come and say hi!

Hyperion Restructure

It appears the company that leads the development of the AmigaOS is most definitely not bankrupt. In fact, Hyperion Entertainment CVBA is in the process of reorganisation, including the appointment of a new executive director and opening up its shareholdership (one can hope A-EON is taking an interest.) A statement has been made at **www.hyperion-entertainment.biz**, along with the suggestion that the best way to support Amiga OS 4.2 development is to buy the very low-cost AmigaOS 4.1 Final Edition. Hyperion expects to be represented at the events above this year too.

Commodore Amiga: A Visual Commpendium

After a highly successful Kickstarter campaign last year, Bitmap Books' Amiga follow-up to the *Commodore 64: A Visual Commpendium* will be on sale to the general public by the time you read this. It features over 420 pages of pixel art, box art and photography from the Amiga's Commodore period, and thus limelight years as a leading gaming platform.

You can find out more at the publisher's website at **www.bitmapbooks.co.uk** or go direct to **www.funstock.co.uk** to check out the purchasing options. Keep an eye out for our review in a future Micro Mart. In the meantime, take a look at the Amiga Mart Facebook page at **www.facebook.com/AmigaMart**.

Two Turntables And A Microprocessor

There ain't no party like an iPad party, as Ian McGurren found outports

Way back in the 1990s, I was, or at least then considered myself, a DJ. Not the wedding party, "Shabba!" shouting type, but the more po-faced, dance music playing, trainspotter type. Many weekends were lost hauling a huge bag of records (yes kids, they are called records, not 'vinyls') toward the lure of a dark room and a pair of Technics SL1200/1210 turntables, ready to entrance the anticipating audience with the latest obscure cuts from R&S, Plus8 and, occasionally, DeConstruction. In reality, it was the back room of a pub for maybe 20 people, most asking for Whigfield, and soon my aversion to ropey trance, coupled with the damage to both my shoulders and my wallet meant my dreams of being the next John Digweed had to come to an end.

While I had given up DJing, I still kept an eye on how it developed over the years following, with the rise in computer power, the evolution of the internet and the seismic shift that was MP3s. Just as I gave up in 2001, CDs had started to arrive, to the great disdain of the big (old) names. But like them, these prejudices to new technology were swept away with a new guard of DJs who copied most of their tracks instead of paying £10 a record, and brought a bag of CDs instead of boxes of records to gigs. Fast forward to 2015, and digital music still rules the roost, plus the CDs have long gone, only to be replaced laptops and, more recently, the iPad. In 2001, taking a laptop on stage was taking your life in your hands, so is performing a DJ gig with an iPad any safer in 2015? As it happens, I had the opportunity to find out, Djing for an old fellow dance-head's 40th birthday. Could I bring the noise as before and bring a whole new meaning to 'mobile DJ'?

There are two camps for DJing, one that uses Ableton's Live digital audio workstation software for creative re-editing, blending and sequencing on the fly, and the other that takes a slightly more traditional approach with vinyl emulation software such as Serato and Traktor, and it's the latter approach and software I was to use.

Native Instruments Traktor was one of the first serious MP3 DJ software packages and over the years has become a staple of the scene. It made the jump to iPad a couple of years back and has been warmly received. I was still skeptical. Would it feel like vinyl? Would the ability to automatically match the beats (previously the main 'skill' that DJing involves) be cheating? Would it just be all a bit toy-like?

Loading my iPad up with a clutch of my MP3s, I got to work. Yes, it did feel a bit like cheating, though frankly it felt pointless trying beatmatching any other way, as it was far too awkward to do so. Moreover it opened up the world of looping, markers and effects. With these, I could mark sections of a track – a melody, a drum loop, a breakdown – jump straight to them in time, loop them as I saw fit and even overlay filters, EQ, reverb. This allowed me to edit the tracks on the fly and combine them in ways I had not been able to before, such as a bassline and drums from one over a looped verse vocal from another. With the ability to also change a song's pitch independently from the tempo, it meant I could mix songs together in harmonic keys far easier. What I lost in performance beatmatching, I gained in manipulation of the music to my own tastes.

There was something missing, though: touch. With turntables, DJing is a tactile activity, feathering the platter to hold beats at the same tempo and blending songs with a crossfader. Thankfully, there's a way of getting that feeling back too, with Native Instruments' Z1 Traktor controller. Essentially a digital version of the analogue DJ mixer, it gives full EQ, level faders and a crossfader, plus the all-important independent cue mix, to check the incoming tracks on headphones.

So how did it stand up? On the night, I felt odd turning up to play with an iPad and the Z1, but as I got into it, being able to essentially create mashups of old tracks on the fly, and with most of the feel of the old setup, was brilliant. All the while, the audience was none the wiser either. What's more, at no point did Traktor or the iPad crash, though I was still anxious that it could do. I could even drop in loops of my own, fresh from my studio, no test pressings needed here.

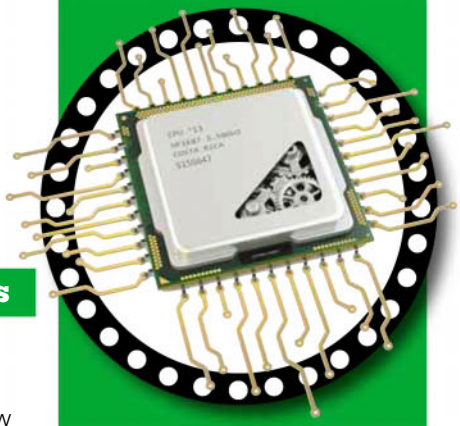
My verdict is this: embrace the technology. It works well, is fun to play and opens up a whole set of new ways to keep the audience dancing. After all, they're what's important, not vinyl snobbery or white labels. The iPad represented itself very well too, and I'd certainly recommend it.

TRAKTOR

Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Router Ruminations: Part Three

You don't need a high-end router to use high-end features, as Andrew Unsworth explains in the third part of Router Ruminations



Last week I mentioned some of the useful features of a modern router and how many of them are woefully under-used. If people only knew about them, these features would make their lives much easier and more efficient. However, you don't always need a high-end third-party router to access these features. You may be able to use them on your regular ISP-supplied router, even if your ISP doesn't officially support them.

Take the BT Home Hub 4, for example. One thing that BT doesn't mention and doesn't support is using a USB flash drive as network-attached storage (NAS). This lets you access music, videos, images and documents direct from your router and is handy if you want to keep a music bank that can be accessed whichever computer you're using or if you want to be able to access your family snaps to show your probably disinterested mates.

To use this feature, attach a USB drive to the HomeHub 4's USB port and then find the IP address for the HomeHub. If you're using Windows, you can click the Network tab in a File Explorer window (it should be listed under Other Devices), then double-click the HomeHub's icon to load the HomeHub's web interface and make a note of the IP address in your web browser's address bar.

You can also find the IP address using the IP Config utility in Windows' Command Prompt. To do this, open Command Prompt by pressing the Windows key and R, typing 'cmd' into the Run dialogue box that appears and pressing enter. Type 'ipconfig' into Command Prompt then press the Enter key. Wade through the list that appears until you find a line that says 'Default Gateway'. You should see an IP address at the end of the line. Make a note of it.

Once you've got your IP address, open the Run dialogue again (press the Windows key and R simultaneously), type two backward obliques ("\\") followed by your HomeHub 4's IP address and then press enter. A File Explorer Window should open, and from there you can click through the folder icon that appears (it'll say USB2 or some such thing) to see the files on the USB drive. Click on the files to play, open or view them.

If memory serves me well, and it may not, so please don't quote me on this, you can also use a USB drive in this fashion on a HomeHub 3 and a HomeHub 5. You can typically also use the above techniques to access USB drives plugged into other types of router, assuming their USB ports are enabled. However, many third-party routers come with special utilities to access USB devices that are plugged into them too. It's worth giving it a go if you want very basic NAS at no extra cost. It definitely pays to make the most of your router. Next week we'll see how modern routers make it easy to configure themselves and how they provide more than one way of accessing their features.

Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

The Road Warrior

The creators of the Just Cause series apply their sandbox experience to the Mad Max universe, and the results look highly promising

This week, Ryan checks out Avalanche's Mad Max tie-in game, and looks at the first details for this year's Call Of Duty sequel...

Plug & Play

The number of genuinely great games based on movies is infamously small; for every *GoldenEye* or *Riddick: Escape From Butcher Bay* there are a dozen lazy licensed tie-ins. You would hopefully have forgiven our initial cynicism, then, when we first heard that Warner Bros. had commissioned a *Mad Max* game to coincide with this year's belated fourth film in the franchise, *Mad Max: Fury Road*. That feeling only lasted, however, until we learned that Avalanche Studios, the team behind the brilliantly anarchic *Just Cause* franchise, was applying its talents to *Mad Max*. Then we saw the first gameplay trailer.

Set in the same parched, oil-drained future landscape as the movies, Avalanche's *Mad Max* takes the form of an open-world action adventure. Beaten up and stripped of your possessions, your aim is to survive in the desert (either by eating dog food, bits of corpse or whatever else you can find lying around) and build your cache of weapons and armour back up before, ultimately, getting behind the wheel of a ramshackle car. You'll meet a variety of rival tribes and crazed warlords – some relatively friendly and willing to trade with you, most completely psychotic. You can combat the latter in bruising fist-fights, shoot-outs or, better yet, highs-speed inter-vehicle fights on lonely wilderness roads.

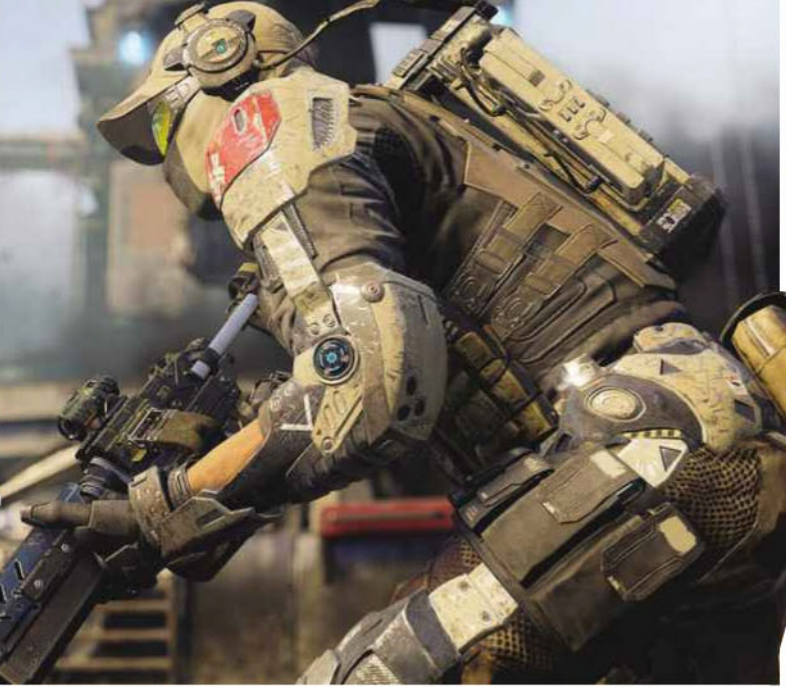
Mad Max doesn't necessarily offer us much that we haven't seen in other sandbox games – its missions and pastimes seem very much akin to the sorts of things we've seen in games like *Batman: Arkham City* and *Shadows Of Mordor* – but it all seems to have been put together with real polish and affection for the films on which it's based. There's even a teasing reference to the Thunder Dome from *Mad Max 3*. The game doesn't look like a lazily reskinned *Just Cause*, either; while the car battles look pleasingly explosive, the absurd physics of the *Just Cause* franchise appears to be absent.

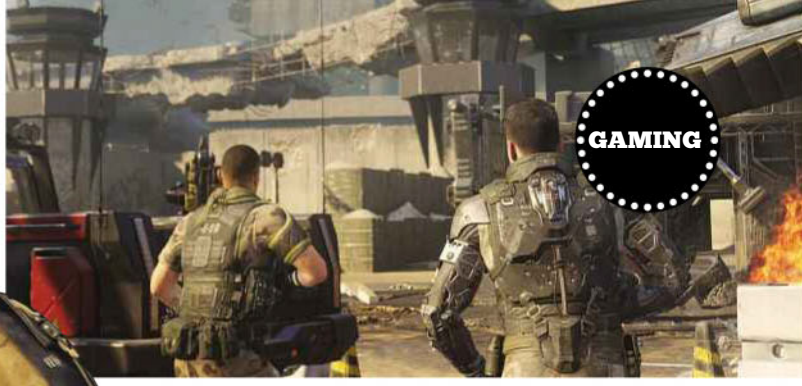
What could potentially set *Mad Max* apart from other open world games is the relationship between players and their vehicles. You can use the car to tow other vehicles or drag the metal covers off secret entrances, and you'll have to find fuel to keep your engine running. With the desert being such a harsh place when you're stuck without a vehicle, we can imagine your car becoming a valued sidekick – not unlike your horse in the classic console game, *Shadow Of The Colossus*.

So while *Mad Max* isn't the biggest release of 2015 – *Star Wars: Battlefront* and *Black Ops III* are the major headline grabbers so far this year – it's immediately

Telltale Inks Deal With Marvel

We're not sure where Telltale gets the energy from. The Californian purveyor of episodic adventure games, Telltale has recently announced lucrative deals with Lionsgate (to make a videogame-TV show hybrid) and Mojang (to make a *Minecraft: Story Mode* series). Now Telltale's joining forces with Marvel Entertainment to make a further string of games, set for 2017. Having already made hit series like *Game Of Thrones*, *The Walking Dead* and *Tales From The Borderlands*, Telltale's going to be extremely busy over the next couple of years.





Black Ops III has had its official unveiling. Treyarch's shooter sequel introduces thruster packs for more speed and agility, plus MOBA-like unique characters

become one of our most anticipated, and we keenly await its appearance on September 4th.

Online

On 26th April, the *Call Of Duty* marketing convoy officially rolled out of the garage, as the first reveal trailer for *Black Ops III* made its grand debut. Treyarch have been afforded an unusual amount of development time to create their latest sequel; by the time *Black Ops III* arrives in November, it'll have been in the works for three years. At first glance, it doesn't necessarily look as though the studio's used that time to come up with anything especially revolutionary; there's a zombie mode, the futuristic setting of *Advanced Warfare*'s back with a vengeance, and there's all the gunplay and explosions you might expect.

What *Black Ops III* does introduce, however, is more speed and agility. Seemingly inspired by the underrated Japanese shooter, *Vanquish*, Treyarch's sequel straps a thruster pack to the back of each player, which allows them to power slide across the ground and run up walls. The result, it seems, is a movement system with some of the speed of *Advanced Warfare*, but with more control and less hurtling through the air.

Black Ops III also switches things up a bit by introducing four different characters, selectable at the start of each multiplayer bout like a MOBA. There's a character named Seraph who wields a gun with armour-piercing rounds. Ruin can jump up in the air and land on enemies with his Gravity Spikes. Outrider has a bow and x-ray vision. Reaper, the most outlandish creation, is a robot with a mini-gun for an arm and a time-travel ability.

The aim, it seems, is to make a *Call Of Duty* game that appeals to people other than the series' other die-hard fans; the introduction of two female player characters and all-the-rage MOBA elements could be proof of that. Will Treyarch's shooter succeed in being all things to all gamers? Time will tell, though it's fascinating to think just how far the series has evolved from its WWII shooter roots.

Call Of Duty: Black Ops III is out on 6th November.

The perspective of Gunpoint and the frenzied shooting of Hotline Miami; Not A Hero's a must-play for fans of retro, arcade-style shooters

Incoming

Indie publisher Devolver Digital's carving out a niche with its quirky and often violent games. And to add to the likes of *Hotline Miami* and pigeon dating simulator *Hatoful Boyfriend*, along comes the frenzied platform cover shooter, *Not A Hero*. The story's utterly bizarre – something to do with a purple rabbit who plans to become mayor by shooting all the bad guys in a crime-ridden city – but the action itself is sublime. You run around a string of warehouses and office buildings, kicking in doors, jumping through windows and gunning down goons. There's a real flow and agility to the gameplay, with your little pixelated hero able to take cover behind bits of scenery, slide along the ground to avoid bullets and knock over bad guys at a manic pace; imagine the addictive speed of *Hotline Miami* mixed with the perspective of the indie stealth game *Gunpoint*, and you'll get the gist of *Not A Hero*'s style. There's a demo available from **www.theujipparty.org**, while the full game's out on Steam from 7th May.

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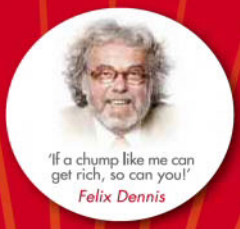

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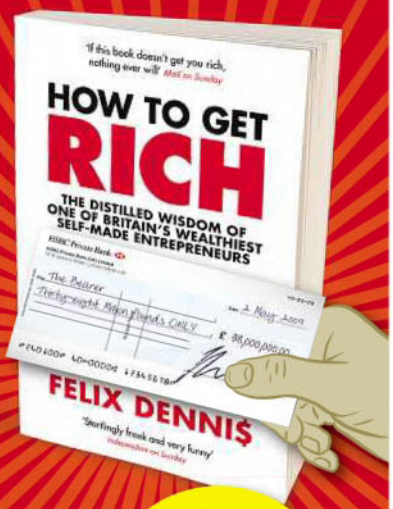

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Complete all fields of your personal details and payment method.

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Have you got any old kit lying around you'd like to get rid of? Fancy making a few pounds while you're at it? Why not advertise in the Micro Mart classifieds? It's easy and it's free, just email what you've got, how much you'd like for it, and your contact details to micromartclassifieds@gmail.com, and we'll do the rest. There are thousands of readers out there looking for components every week, and you may have something unwanted they've been searching for – so get in touch and save your kit from going to the tip!

IBM Thinkpad T30 laptop for spares or repairs. Excellent condition, but does not bootup. Not sure why. Could be an easy fix or for parts/spares.
£15 plus P&P.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Webcam (Trust Spacecam). Boxed with CD of installation software and instruction manual. Perfect condition. £10.
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E-mail: scobieg09@gmail.com

HP Photosmart C4585 All-in-One multifunction colour printer. Perfect condition. Includes software and manual. £20.00
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E-mail: scobieg09@gmail.com

Laptop Hard Disk Drive. Fujitsu. 20GB. Excellent condition: £10.00.
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E-mail: scobieg09@gmail.com

ASUS P5QL-EPU Motherboard - 775 Socket - DDR2. Tested and removed from a working environment, comes with I/O Plate. £45 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

PC Desktop Ram (DIMM) Memory. Siemens PC100 - 222- 620 16M x 64 SDRAM. HYS64V16222GU-8 Only £8.
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E-mail: scobieg09@gmail.com

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E-mail: scobieg09@gmail.com

Asus Z97 Gryphon Armor Kit. Steel backplate with plastic top and auxilliary fan. Also some minor plastic bits. £20. Email for more details.
Email: graham_rocknell@yahoo.co.uk

Netgear DG834N Rangemax Next Wireless N Modem Router kit. Excellent condition complete with power supply, network cables, telephone cable, ADSL filter and setup CD. £10.00.
Tel: David Ewles (01295) 253554
Email: david@ewles.gb.com

Laptop for sale. Toshiba Portage i5 2.5GHz Model R830-13c 4GB RAM, 320GB HDD. Wi-Fi, fingerprint scanner, HDMI ouput. Sold on eBay for over £200; only £150 plus £15 p&p. Bargain. Great condition. Very light.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

LAPTOP HARD DRIVE. 160GB SATA 2.5". WESTERN DIGITAL. Model: WD1600BEVT. Fully tested. Perfect working order. Partitioned and formatted NTFS. Free postage. Price £22. Paypal accepted.
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Vintage Amstrad PC1512 HD20. Colour Monitor 20MB Hard Drive 5.25 Floppy Original Amstrad Disks Manuals spare Keyboard and Mouse. This is a rare fully functioning collectable. £60.
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4x 1GB DDR2 Ram (OCZ Nvidia SLI PC2 6400 epp 4-4-4-15). £40.00 for all 4 + Post/Packing. Perfect working order.
Email: ken.toole1@virginmedia.com

Seagate Barraucda 250GB SATA Hard Drive 3.5". Tested and removed from a working environment. £12 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

Corsair Vengence 16GB (2x 8GB) DDR3 Memory CMSX16GX3M2A1600C10. Never used but box opened. Selling due to wrong voltage, these are 1.5V and I needed 1.35V. Asking £85.00 inc. postage to the UK.
Email: fabstock1@gmail.com

4x 1 GB DDR2 RAM (Ocz Nvidia SLI PC2 6400 epp 4-4-4-15) for Sale. £40.00 for all 4 + Post/Packing. In perfect working order.
Email: ken.toole1@virginmedia.com

HP Microserver n40l / windows 7 Pro / 4GB RAM / 400GB drive / MS Office 2003. This HP n40l Microserver is in excellent condition and comes with Windows 7 re-allocated, activated, & completely updated Feb 2015. Also installed is Minitools Partition Magic, MS Office 2003 HP basic, with codes/ coa's. Buyer may have Linux Mint, or a completely bare drive. 2 spare drive frames. I have the original packing as per HP original delivery. So far as I can see, this Microserver will take 16GB memory and up to five hard drives. See it working before buying, (by arrangement). No refund under any circumstances. Collect from Harrogate, North Yorkshire. £140. Cash on collection. Delivery might cost £8 via Hermes, maybe much more to Highlands/ Islands. Payment by Cheque O.K subject to clearing, Paypal at £25 additional. (to cover their fees).
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Email it_central@ntlworld.com

Used Asus Wireless Router for sale. Dual-band 4 x GB Ethernet Wi-Fi RT-N66U N-900. £65.00 O.V.N.O. Selling cause I have no need for it since upgrade to BT Home Hub 5.
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XFX GeForce Nvidia 8800Gts Graphics Card For Sale. £40.00 + Post. In perfect working order
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Custom Built modified watercooled gaming desktop. i5 4670K, R9 280X, Silverstone RV-01 USB3, 1000W PSU: parachord sleeving, Z87M OC Formula, 8GB Kingston Fury 1866MHz, 180mm and 120mm Radiator. Mods, Yellow and Black colour scheme! No Storage. Email for pics and info. Buyer collect: Gloucestershire. £800 ono.
Tel: Adam (07426) 874117 Email: flaming_monkey95@hotmail.co.uk

Asus A8V motherboard, socket 939. Clips holding CPU cooler broke, CPU overheated & shut down. M/B should be OK and there is 4GB of ram on board. Free, collect only. North Wales. Tel: (01286) 678584
Email: gw7hav@googlemail.com

Kingston HyperX 2x2GB DDR2 1066MHz RAM. Tested and removed from a working environment. £45 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

CPU sale. Intel Core 2 Duo E4400 2.0GHz £10, Intel Pentium 4 630 3.0GHz £7, Intel Celeron M 350 1.3GHz £5, Intel Celeron Mobile Dual core T1500 1.866Ghz £6, Intel Pentium 4 630 HT 3.0Ghz 2MB cache £8, AMD Athlon 64 3200 £5 Athlon 64 3500 £6 Athlon 64 3200 Dual core £10 postage £2.
Tel: Jeremy Gill (02089) 430683
Email: arthur.pewty1@virgin.net

2 x 512MB PC3200 DDR400. These two sticks were removed from my working system, now redundant. £5, plus £1 P&P.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

DDR2 memory sale. 2 x Nanua PC2 3700 256MB £6 pair, 2 x HP PC2 4200 256MB £7 pair, 4 x HP PC2 4200 512MB £10 pair or £18 for four.
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TP-Link 54Mbps 4 port Wireless G Router. Perfect condition and boxed. Model: TL-WR340G. £20.00 plus postage.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Intel Core 2 Duo E4600 3GHz 775 Socket Processor. Tested and removed from a working environment. £10 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

Addon Wireless LAN USB 2.0 54Mbps 802.11g Adaptor. Boxed with instructions and software: £9.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

CD Stomper CD/DVD Labelling System: Software, Labels and Label Applicator. Boxed. Unused. £9.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

56kb Fax Modem External. £10.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

DIR-615 Wireless N Router. Boxed, brand new. £30.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

2x 1GB PC2100-648. These two matched sticks were removed from one of my redundant systems. Plus one PC2700 (DDR 333Mhz) and one 512Mb PC3200 DDR400 stick. All for £5 plus £2 P&P.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

Laptop DDR2 memory sale. 2 Corsair Value Select 533mhz 1GB £18 pair, 2 Hynix 800mhz 2GB £26 pair, 2 Generic 533mhz 1GB £15 pair,1 Generic 800mhz 1GB £10,1 Nanua 666mhz 1GB £, 1 Samsung 666mhz 1GB £8. Postage included
Tel: Jeremy Gill (02089) 430683
Email: arthur.pewty1@virgin.net

Two 120GB Maxtor DiamondPlus 9 Drives plus one 80GB DiamondPlus 10. Can be supplied with two plug-in caddies. No reasonable offer refused.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

HP Elitebook 8760w i7 2820QM @ 2.2GHz 32GB RAM 750GB HDD Quadro 4000M GPU. Only 2 small marks on whole machine. Cost £3500 when new. £900 ONO
Tel: (07772) 926632
Email: stedaley19@gmail.com

WD 2TB desktop hard disk. Formatted ready for an OS. Runs very nicely. New laptop means my desktop items must go! £40 includes free tracked postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

Toshiba C500D-B-11 laptop. Virtually new cost £279 will accept *£150 O.N.O.*
Tel: (01217) 535324

Intel 3930K processor. Used, but not overclocked. No box or fan. £220 ono. Will ship to UK address.
Tel: Tim (01623) 624509 Email tim.stirland@btinternet.com.

Amstrad PcW 9256 in good working order with software. Offers.
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Email: meeching@uwclub.net

Asus P8Z68-v LX socket 1155 motherboard. Original box 1/0 cover user guide driver disk fitted core i3 2100 CPU 3-1GHz and 8GB PC1300 memory. No fan. Working fast and fine. £125 + free postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

ASUS P5B Motherboard - 775 Socket - DDR2. Tested and removed from a working environment, comes with I/O Plate. £35 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

SAMSUNG GALAXY Tab 3 for sale. 2mths old, 8GB, wi-fi, £80 open to offers. Willing to post at a charge.
Tel: Christine (01386) 831836

SoundBlaster Audigy SE 7.1 soundcard for sale. Perfect working order. Selling due to not being needed any more. Just £12 plus postage.
Tel: Ian (01132) 629028
Email: ianmatthewuk@yahoo.co.uk

Asus p8h61-mle motherboard socket 1155. Original box 1/0 cover driver disk manual together with Celeron 91620 dual core CPU and 4 9195 pc1300 memory. Working fine. No fan. £70 + free postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

Toshiba Satellite SA60 laptop. Model PSA60E-092058EN. Windows XP Home Edition with Certificate of Authenticity. For spares or repair - broken power connector on mobo. No power cord. Otherwise in very good condition. £40.00 + p&p
Tel: Peter Scarth (01452) 372350
Email: pscarth@blueyonder.co.uk

Apple Touch 32 GB iPod. Virtually new cost £199 will a ccept £100 O.N.O
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400GB IDE drive 3.5 inch formatted ready for use. Only £20 plus £3 for p&p. I can load genuine XP Professional from Microsoft with genuine certificate of authenticity for an extra £10. Refurbished.
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Email: davethomas96@aol.com

Amstrad PcW 9256 in good working condition with software. Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

Panasonic KX-P7105 mono laser duplex printer. Some toner left. Up to XP only – hence £25. Buyer collects from N2, East Finchley
Tel: (02083) 431527
Email: pnnikiel@gmail.com

Amstrad PcW 9256 in good working condition w/ software. Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

GEFORCE 1GBYTE 24- PCI express PC card. HDMI DVI VGA PC video card. £10 plus p&p £4.50. 2 for sale. £10 each.
Tel: (01707) 339063
Email: awhishaw@aol.com

HP 4GB memory Microserver with two hard disc drives. £110. One with Linux MINT. Other with Linux FreeNAS. This will also run Windows 7 and Windows Server or Home Server. (Win 8 I've not tried it) Two spare HD slots with appropriate caddies. Slot for your SATA DVD drive also, (or use external usb or DVD drive if needed. four usb sockets on front, two on rear. VGA, network, power sockets on rear. Supplied in original HP box with CD and leaflets etc.
Collect from Harrogate, North Yorks, or posted via Hermes for £12 (or less if I can do it cheaper). Cash on inspection and collection (Highlands and Islands might obviously cost more to be delivered).
Tel: (01423) 872045
Email: it_central@ntlworld.com

400GB IDE drive 3.5 inch formatted ready for use. Only £20 plus £3 for p&p. I can load genuine XP Professional from Microsoft with genuine certificate of authenticity for an extra £10. Refurbished.
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Email: davethomas96@aol.com

EPSON PRINTERS T715 12 multipack F.O.C. to good home, just pay postage £2.50. (Tesco equivalent original cartridges £120 current special offer!) Perfect crisp printing etc.
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Tel: Pete Dew (07526) 988594

Lexmark Printer Z601, still working and in good condition, £25.
Tel: (01386) 832758

Intel 3930K processor. Used, but not overclocked. No box or fan. £220 ono. Will ship to UK address.
Tel: Tim (01623) 624509
Email tim.stirland@btinternet.com.

Apple Mac G4 Tower. 400MHZ cpu, 640MB Ram, 2xHardDrive 40GB,20GB. DVD & ZIP Drive. OS X v10.3 Panther+OS9. NO KEYBOARD OR MOUSE. £25 ono Buyer collects
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Email:omendata@gmail.com

Dell Inspiron 660 Intel i5 QUAD CORE with ACER 23 Inch LED monitor. AS NEW. Operating System: Windows 8.1. MPN:620MT. Memory (RAM): 4 GB. Hard Drive: 1TB. Processor Type: Intel Core i5. Primary Drive: Optical DVD+/-RW, Processor Speed: 3.0 GHz, Features: Graphics Card GT620 1GB. Acer LED monitor 23" HD. £520
Tel: Hitesh Rao (01163) 198895

PRINTER CARTRIDGES. Suitable for Epson printer range T711 - T714. Work perfectly. 50 pence each, plus postage (brand new unused sealed). Over a dozen available.
Tel: (07541) 222678
Email: petedew@gmx.co.uk

PRINTERS T481-T486 6 multipack F.O.C. to good home, just pay postage £2. Perfect crisp printing etc.
Tel: Pete Dew (07526) 988594

INKJET CARTRIDGES suitable for Epson Printers T711 - T714 range, and T481 - T486 range. 79 pence each, plus postage. Work perfectly, good crisp printing quality.
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Email: petedew@gmx.co.uk

Powered PCI Express x1 To x16 Riser Card Extension via USB 3.0 + Power Cable Adaptor. Allows you to add an extra Pci-ExpressX16 slot to your Pc converting an existing x1 slot to x16. Useful for adding an Extra graphics card to create a Crossfire triple configuration or for Bitcoin data mining up to 7 cards can be installed using these adaptors. Quality model - Brand new still boxed. £10. Price inc. P&P
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Laptop Removeable drive tray. Allows you to add an extra hard drive to your laptop by taking out the CD/DVD drive. This device inserts into the Cd/Dvd Empty Slot and holds 1 Hard Drive. Excellent Engineers Gadget - Great for data recovery or just beefing up. Two types available - standard Sata To Sata or Sata To Ide (Pata) Slot type. Brand New Still In Box. £20.
Email: omendata@gmail.com

Amstrad PCW 9256. In perfect working order including on-top printer with a few 3" disks. Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

2 HP Laserjet 3100 printer-fax-copier-scanners. In good working order. £25 each.
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Email: meeching@uwclub.net

Lian Li PC-X2000 Computer Case. Supports mATX, ATX, eATX; hot swap SATA drives, six 3.5" & two 2.5" hot swap disc holders. Three 140mm intake plus two 80mm and one 140mm exhaust fans. £140.
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Email: a2345@btinternet.com

1.5TB SATA drive. Fully refurbished by government acknowledged company. All data taken off (some drives are still under Western Digital warranty) ONLY £40 including P&P
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1TB SATA drive. Fully refurbished by government acknowledged company. All data taken off (some drives are still under Western Digital warranty) ONLY £38 including P&P
Tel: Dave Thomas (01942) 706572
Email: davethomas96@aol.com

Blueberry I-MAC. Good condition, all in working order, £55.
Tel: (01386) 832758

2TB Western Digital SATA drive. Model WD2002FYPS 64mb cache, fully refurbished by government acknowledged company. All data taken off (some drives are still under WD warranty) ONLY £50 including P & P
Tel: Dave Thomas (01942) 706572
Email: davethomas96@aol.com

Lexmark Portable Photo Printer P315 model. New, boxed, unused. £30.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

HARDWARE WANTED

Trying to breathe life back into an old machine? Why not submit a wanted ad and see if any of the thousands of computer enthusiasts who read the magazine each week have what you're looking for?

WANTED: Fractal Design Define XL full tower case. R1 (original version) in black.
Tel: (01670) 860146
Email: mm@tectron.co.uk

WANTED: Working Dot Matrix Printer in Good Condition. Thanks!
Email: printer.20.odaily@spamgourmet.com

WANTED: Acorn computer either an A5000 or A7000. Also book on teaching yourself binary.
Tel: (07817) 861011
Email: Johnhaviland73@gmail.com

WANTED: Corsair PSU cable bag. Please email me if you can.
Email: Paul@planetvoodoo.co.uk

Wanted: HD 3850 Graphics card, must be AGP. *Tel: (07817) 861011*
Wanted: Fully working mainboard for AMD socket AM2+/AM3, micro ATX size. Must use DDR2 RAM.
Tel: Brian Taylor (07570) 452557
Email: bmorgant@yahoo.co.uk

SOFTWARE FOR SALE

Do you have any old software that you simply don't use? Why not advertise is with us and see if anyone else can make use of it – you may well be surprised to find that someone is looking for exactly what you don't need!

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Windows 7 Ultimate 32-bit version . NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £45 including P&P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Sim City 2000. Boxed and original. Classic gaming. £15.
Tel: Gordon (01314) 660205 E-mail: scobieg09@gmail.com

Windows 2000 Professional. NEW software and license (certificate of authenticity) 100% genuine and unopened software. ONLY £15 including P & P.
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Windows Vista Business. New and sealed. software and license (certificate of authenticity) 100% genuine and unopened. (Dell branded but will install on any machine) ONLY £15 including P&P
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Windows 7 Home Premium 32 bit versions. NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £35 including P & P.
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Cyberlink PowerDVD 12 Standard. Runs under Windows 8, 7, Vista or XP. Original CD with unused product key £7.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Nuance Omnipage 18. OCR Runs under Windows 8, 7, Vista or XP, Original CD with unused product key £25.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Acronis True Image Home 2012. Bootable CD. Application runs under Windows 8, 7, Vista or XP. Original Acronis CD with unused product key £5.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Windows 7 ULTIMATE 32 Bit and 64Bit DVD disks incl. SP1 This is my "Get Genuine Kit" from Microsoft not OEM. New install or legalise your copy with full Product Key. only £50 incl. reg. post
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Norton Family Premier 2.0. Runs under Windows 8, 7, Vista or XP, Original Symantec unused product key £15.
Tel: Ian (01932) 856971 Email: a2345@btinternet.com
Microsoft Office 97 Professional. Original disc with key £18 inc postage.
Tel: Andrew (01376) 512118

Windows XP Professional. New and sealed. Book, software and license (certificate of authenticity) 100% genuine and unopened. (Dell branded but will install on any machine) ONLY £15 including P&P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Microsoft Office Small Business Edition 2003 with Business Contacts. Legitimate Office Small Office Business Edition comprising Word, Excel, Powerpoint, etc. Comes with small piece of OEM hardware and original license code (coa) £10 incl. delivery, cheque or PO. £10.50 by Paypal.
Tel: (07794) 528857 Email: it_central@ntlworld.com

Norton Utilities 16 for 3 PCs. Runs under Windows 8, 7, Vista or XP, Original Symantec CD with unused product key £12.50
Tel: Ian (01932) 856971 Email: a2345@btinternet.com

Dell Windows XP Pro SP2 Reinstall Original Cd. Allows You To Restore Your Dell PC / Laptop Without A Licence Key. Brand New Still Packed. £10. Includes p&p.
Email: omendata@gmail.com

SOFTWARE WANTED

Wanted: LG GSA 2164 D software disc to replace broken original.
Tel: Glen Fremantle (01387)248976
Email:bldamsys@yahoo.co.uk

Wanted: Windows 98 CD ROM operating system with boot disk, instruction manual and serial number. Tel: Craig (07867) 930265 or 01912093677
Email: craigtin44@hotmail.com

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• Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk

• Keep copies of all correspondence

• When sending out goods, at the least obtain a certificate of posting from the Post Office

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Every year, thousands of successful transactions take place through our classifieds, and that's just how we like it.

Help us help you keep them one of the safest and most secure places to buy and sell computer kit.

ASK AARON

Meet Aaron Birch. He's here to help you with any general upgrading, software and system building issues. He's got advice aplenty, and you're very much welcome to it!

Send your questions to:
Aaron Bich
Micro Mart
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30 Cleveland Street
London
W1T 4JD

Contact Aaron by email at:
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

NTI Fan Club

Finally a mention for NTI Backup now in *Micro Mart*. I, like Jason, use NTI to back up and restore my computer using the excellent bootable feature not found on many other back up applications.

It allows me to restore the operating system including my software, files, photos and music in less than an hour. Other back up software allows you to restore files and photos etc. from boot up, but not the operating system.

It's great to see NTI in *Micro Mart* even if it's not a full review. I'm sure your readers would be very interested in finding out more about its ease of use and excellent features.

Peter

If you're looking for a commercial, paid for backup solution, NTI Backup is certainly a good option, and it would appear as though a lot of Micro Mart readers share your fondness for the application. It features all of the usual backup features, as well as the bootable backup feature you, Jason, and many others are so fond of.

The issue here for many is the price, and the fact that there are quite a few perfectly capable cheaper, or free backup tools available. If you simply need to backup data, and are not as concerned about the advanced options offered by NTI, a free option will always be more attractive. If you value the flexibility, and need more power behind your data protection, then options like NTI are the way to go. You can get a trial of the software from the website, which is ***www.nticorp.com****.*

NTI Backup comes in various guises, including the popular Backup Now, and the easier to use Backup Now EZ

Video Lag

My PC is fairly old now, but it still manages to handle what I need of it, except one thing that is. I like to watch a lot of streaming video, which I usually do via my games console in the lounge, but I'd also like to be able to do the same on my PC. For some reason I cannot, though, as video doesn't run well, and I would describe the playback as choppy at best.

As it's just video, I'm really not sure why my system can't handle it. It's no powerhouse, but I'd have thought it should be able to handle this task.

The system runs Windows XP, and is an AMD Athlon XP, running at 1800MHz I believe, and I have 512MB RAM with an S3 ProSavageDDR, which has 32MB RAM.

Can you suggest anything I can do to enable a smooth playback of video when online? Is it even my PC, or have I got a problem with my Internet? It's a 20Mb broadband connection.

Vic

I'm afraid I've not got a whole lot of good news for you here, Vic. Basically, your PC is very

old, and the specification is more than a little underpowered for most up to date software. The CPU is slow compared to even the cheaper, basic CPUs now available, your RAM is limited, and the graphics card is lacking any real muscle, to the point where this all adds up to a lack of ability to properly stream video.

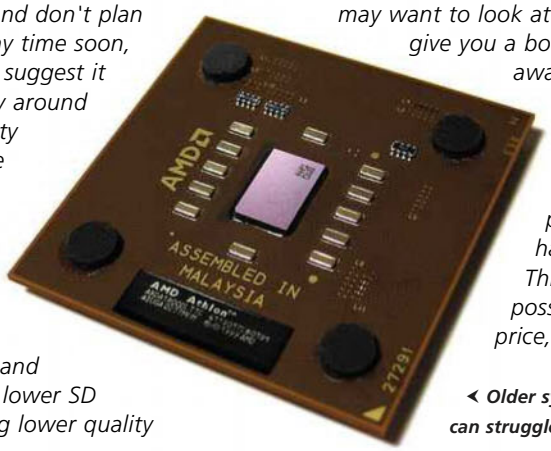
The latest driver for your graphics card was issued by S3 on February 2, 2005, so there's no hope for any recent upgrades, and as you're running Windows XP, wthich is no longer supported by Microsoft and most software developers, there's little sign of hope there. It's not a good situation, I'm afraid.

I wouldn't worry about your Internet connection, as a 20Mb service is more than enough to stream video. You could have issues with throttling, or with local congestion, but that's something you'd need to contact your ISP about so you can act accordingly. As you're seeing no problems on your games console, however, it appears as though your connection is the least of your worries.

You didn't mention how your PC handles non-streaming video. If it has the same issue (which I suspect is the case if you're trying to play high definition content), the problem is definitely with your system hardware configuration.

If you're determined to use your old PC, and don't plan to upgrade any time soon, all I can really suggest it you try to play around with the quality settings of the stream video players you're using. Stay clear of HD options on players like YouTube, and stick with the lower SD settings. Trying lower quality means there's less data to stream, so your hardware shouldn't have to work as hard, but there's no guarantee that this will help matters. Also try buffering video fully before you play.

Streaming video is quite tough on the CPU, which is likely the cause of your problem, so if you change your mind and plan to pick up a cheap upgrade, you may want to look at this first. It'll also give you a boost in other areas. Be aware that you'll likely need to upgrade your motherboard and RAM too, which will likely have more powerful graphics hardware built in. This should all still be possible for a decent price, though.



Older systems, and older CPUs can struggle with video streaming

Storm In A Teacup?

I'd like to know if storms and power cuts really are a danger to PCs, or if it's just a myth that these incidents can damage computer equipment. We've had quite a lot of power outages, and a couple of big storms where I live, and my PC has been fine, leading me to believe this isn't a major problem, and a ploy to sell more expensive surge protectors. Am I wrong?

Sam

Power outages and surges are far more than a myth I'm afraid, Sam. They're a very real threat, which is easily understood if you consider what's actually happening when such instances occur.

Power cuts are a danger to PCs as they force them to shut down instantly. As PC's normally go through a controlled shut down procedure, which closes software and deactivates hardware in a safe manner to avoid problems, skipping this can be disastrous. Data can be corrupted, drivers damaged, and Windows itself can suffer problems resulting in an unbootable PC. Solid state drives are particularly vulnerable in such instances, and there have been cases of such volumes suffering irreparable damage. Brownouts, which are merely dips in power, not total cuts, aren't as much of a worry, however, as you'll often be lucky and your PC won't actually shut down.

Power surges are a bigger problem than either of those occurences, however. That's why many choose to unplug PCs and other devices during a storm, or use surge protectors. A lightning strike on a local power line can cause a massive surge of electricity in the grid, which can find its way in to your home. The power produced by such a strike is several millions of volts, compared to the UK standard of 240V, so even if a fraction of that surge gets to your system, it can easily fry internal components. This is where surge protectors can come in handy, as they're designed to divert excess electrical current. Not all surge protectors are successful, but there are some good models out there. Be aware, however, that after a power surge, many surge protectors have to be replaced. The best protection is still to unplug your hardware at the power socket, though.

To protect against power outages a UPS (uninterruptible power supply) is your best bet. These are charged up with reserve power, which is used should mains power be interrupted. Heavy duty UPS models often used by corporate I.T. can hold enough power to keep servers up and running for a while, but many home models aren't as effective, instead giving users enough time to save any work and safely close down a PC. If you live in an area that suffers from a lot of outages, a UPS could prove to be a very useful purchase.

UPS devices can be a lifesaver if you suffer a power outage, but many only provide a few minutes of power

ASK JASON

Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

It's Official

A few weeks back I bought a second-user HP Chromebook 11. The charger's packed in, so I'm using the one from my phone. I thought all micro-USB chargers were pretty much the same? Well, I keep getting a message telling me my charger isn't the official HP one. How does the Chromebook know this? I'm also having charging issues. Even with the charger in place, sometimes the battery level actually drops, while at other times it might creep up to 30% or so. Do I really need an HP charger? How much will that set me back?

Stuart, Gmail

In a handful of instances, a device will use a charger that transmits an ID signal. If the device doesn't receive this 'handshake', it'll throw up a warning or even refuse to charge. I've seen this on some laptops, notably a few Dell models. It's not common practice, and I'm sure it's not the case with your Chromebook.

All that's happening is that the charger you're using doesn't provide enough power. USB chargers are always 5V (or thereabouts), which is why you can usually mix and match them between devices. But most are aimed at phones and maybe tablets and as such have an amperage of 1A or even just 500mA. HP Chromebooks require 3A. Volts × amps = wattage (power). 5V × 1A = 5W; 5V × 3A = 15W.

Your Chromebook doesn't 'know' your charger isn't official; it just knows it's under-powered. If you turn the Chromebook completely off, no doubt a 5W unit will charge the battery eventually. Pack a suitcase and go away for the weekend – perhaps it'll be ready when you get back. As you're finding, however, there's insufficient output to actually keep the Chromebook up and running. Even with the charger plugged in, the battery drains.

A 3A charger can be had for as little as £5. As ever, Stuart, visit eBay. For that money you won't get an official HP unit, of course, but in my experience generic units are fine. Others may disagree, claiming a cheap charger could burn down your house. Well, yes, I suppose that's possible, just as it's possible Lord Lucan could knock on my door and ask to borrow some milk. The decision is yours. If you prefer to go official, head to ***partsurfer.hp.com****. I can't tell you what you'll have to pay (£25?), because as I write, the site's totally broken. Well done there, HP.*

PS – How old is your Chromebook? It's just occurred to me that early examples of the Chromebook 11 shipped with chargers that HP later recalled. They had a tendency to overheat. If your example was sold before December 2013, Stuart, HP may well dispatch a replacement charger for free. Visit ***goo.gl/s6ixn4****, enter the Chromebook's serial number, and see what's what.*

While micro-USB chargers can usually be mixed and matched between devices, using an under-powered one will prove frustrating

Sticky Situation

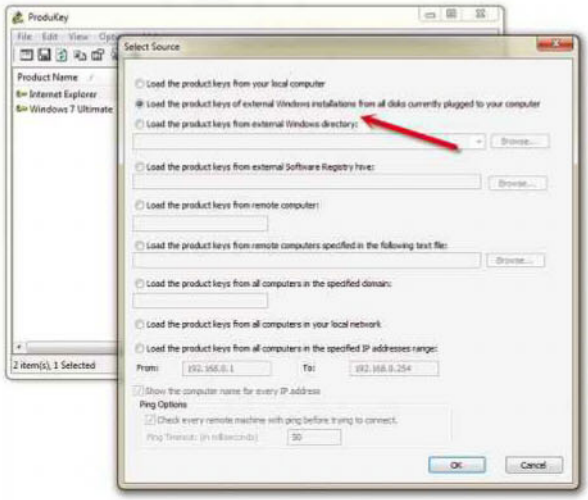
I'm in a spot of bother with my Toshiba Satellite Pro L550 laptop. Basically, Windows 7 no longer loads. It gets to the boot menu – 'Last Known Good Configuration' and so on – but no matter what I choose, the laptop restarts. I'm assuming the hard drive's failing, thought the fact the boot process gets as far as it does casts some doubt on that. Anyway, Windows needs reinstalling – maybe on a new drive, maybe not. Snag is, the product-key sticker isn't readable. Some of the characters are guessable but not all. Is there any way to find the key in a non-bootable OS?

Patrick Cannon, TalkTalk

Give ProduKey a spin: goo.gl/Mmdh9j. This handy piece of freeware lets you retrieve product keys not only from the currently running OS but also from OSes installed on any attached hard drives. You could therefore remove the laptop's drive and hook it up to another machine.

*If that sounds like hard work, ProduKey also lets you scan a specific folder. You could start up the laptop with a live Linux DVD (maybe Mint: **www.linuxmint.com**), access the hard drive, and copy the C:\Windows\System32\Config folder to a USB stick (this contains the registry). You could then shove the USB stick into another PC and let ProduKey scan for the Windows key from there.*

However, bear in mind something I've mentioned in these pages before, Pat. With big-brand manufacturers, all examples of a given PC are set up using an image of the same master hard drive. Therefore, they all have the same Windows product key, pre-entered and pre-activated. There's a high probability that it's this 'volume' key you'll end up retrieving. When you enter it on a new installation, you'll likely be told it's invalid, and I doubt it'll activate.



▼ *ProduKey enables you to retrieve product keys from Windows installations that won't boot*

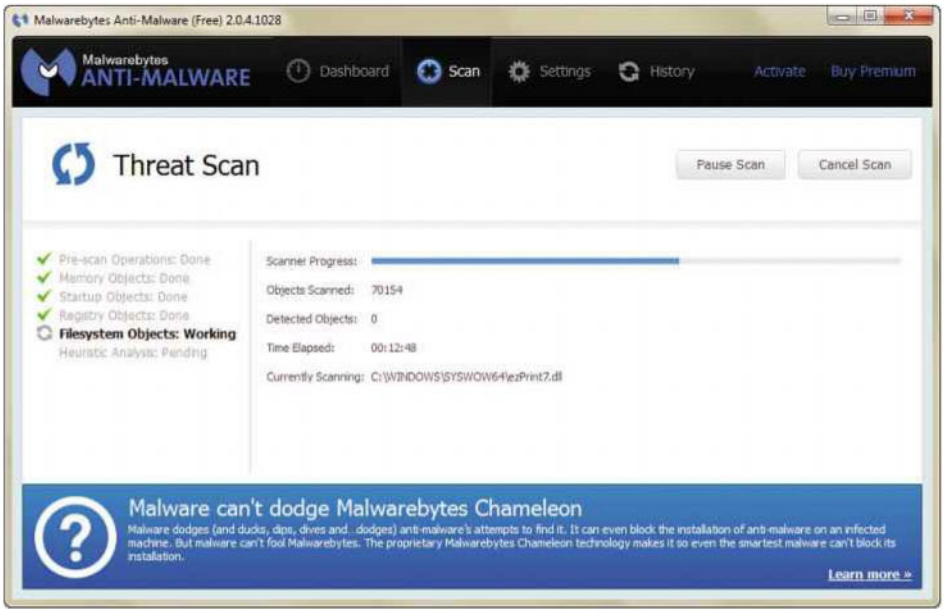
If that's the case, go back to your illegible sticker. Take a close-up photo. Open this in something like Paint.NET (free at www.getpaint.net) and zoom in as far as possible before the characters begin to pixelate. Some of those illegible characters will likely become a lot more guessable. This is something else I've discussed earlier. You can probably make things even clearer by converting the photo to grey-scale and boosting the contrast, bringing out the black ink against the pale background. Have a fiddle with the options under the Adjustments and Effects menus too – the sharpening tool's a good bet.

When making a guess at some of the characters, remember that Microsoft has made matters easier by rendering several invalid. If you've got a character that looks like a number 0 or a letter O, it's neither – they're invalid. Try a Q. The full list of invalid characters is as follows: A, E, I (i), L, N, O (letter), S, U, Z, 1 (one), and 0 (number).

Bitter Suite?

I signed up to BT Infinity fibre broadband recently and I've installed the NetProtect Plus security package. A few days ago, however, I got a pop-up saying my PC was at risk. This was clearly some sort of scam, and it also put an exclamation mark inside a red triangle on my desktop. A friend managed to clean the PC up, but how did this infection get there in the first place? What security tools should I be running in addition to NetProtect Plus?

Robert W Edwards, Strathclyde



▲ *When it comes to anti-malware, running multiple real-time tools is asking for trouble, but running periodic scans with several on-demand tools is actually highly recommended*

NetProtect Plus is a McAfee suite provided free to all BT Infinity users except those in the cheap seats (who can choose to pay a monthly fee). I don't rate McAfee myself – just my opinion – but there's no reason it won't give your PC decent protection. Nasties sneak past all anti-malware tools from time to time.

Regarding secondary measures, Robert, it's a mistake to run more than one real-time anti-malware tool at once. By real-time, I mean a product that's always on, always monitoring, working in the background and alerting you as necessary. Having more than one will just cause conflicts and make your PC run like Usain Bolt with a fridge freezer strapped to his back. What's advisable, though, is running periodic scans with one or more on-demand products, in particular those tackling spyware and adware rather than viruses.

*At the top of anyone's list is Malwarebytes Anti-Malware (MBAM): **goo.gl/neZEP4**. Also popular is SuperAntiSpyware (SAS): **goo.gl/eI4Zv7**. A tool I'd not heard of till last week and which apparently also performs with aplomb – I've not yet had the pleasure – is Emsisoft Emergency Kit (EEK): **goo.gl/Wb9qnp**. These are all free or have free versions. Bang 'top free malware remover' into Google and you'll doubtless encounter numerous other worthy candidates. There are some online tools too. Pick one or two products and run them maybe once a week, downloading the database updates beforehand.*

Crowdfunding Corner

What things caught our eye this week, and can they convince you?

RECON – Foldable Bluetooth Mouse

Portable mice are a good idea in theory, but in practice they're normally awkwardly shaped and resist being packed efficiently alongside a laptop or tablet. But what if there was a laptop that you could pack flat? The RECON might just solve that problem for you, with its foldable design that claims to be inspired, slightly worryingly, by the human spine.

The RECON mouse uses a Bluetooth 4.0 connection to link with laptops, tablets and PCs, and powers itself with a micro-USB-rechargeable 400mAh li-on battery. It also supports four different sensitivity levels (up to 2400dpi) so you can customise the precision of input while you're working. At just 9mm thick, it's thin enough to slip inside all manner of cases while still containing two standard buttons and touch-scrolling input.

The RECON's goal is a modest £10,000, and at time of writing it's already halfway towards that target. Early bird backers can pick one up for £34 with free shipping, while the full retail price is just £40 or £35 if you back for two. All Kickstarter backers who pledge for the mouse also get a free foldable smartphone stand! Delivery of all rewards is planned for August of this year.

URL: kck.st/1EorVxu
Funding Ends: Wednesday, 10th June 2015

MoonRay – Desktop 3D Printer

3D printing is undergoing a transition from enthusiast to home hardware, and that means Kickstarter is filled with 3D printer innovation. The MoonRay printer is designed to give home users a high-resolution 3D printer with a range of features most consumer units omit entirely.

The printer is fairly compact – just 15" x 15" x 20" – and comes in either Cosmic Gray or Lunar White. No assembly is required, and even its lid is attached by magnets so you can easily remove your printed items. Its built-in software can automatically create bases and correctly placed supports for your designs and has a special anti-aliasing algorithm to smooth items off.

The full build area is 5" x 3.2" x 9", and its custom resins are designed to be affordable. A built-in RayOne UV projector allows pinpoint accuracy when printing with 100-micron accuracy for creating fine detail, and cures resin efficiently, without wasting energy to visible light or heat. It's cool and quiet, and the bulb has a 50,000-hour lifespan.

The project has already doubled its original goal of $100,000 (£64,568), but that's probably because a printer costs as much as $3,099 (£2,000) if you want it shipped internationally – though cheaper versions are available if you're fast enough to get an early bird version. The way this is disappearing, we wouldn't bank on that happening, though!

URL: kck.st/1dq6Qdh
Funding Ends: Sunday, 7th June 2015

Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

Mysteries And Conspiracies

David Hayward spends a lot of time lying on the floor this week

We, as a family, recently took a trip out to Rendlesham Forest. It's more or less just down the road and is filled with wonderful walks through some of the beautiful forests and landscapes the East of England has to offer.

However, it also has a dark and mysterious side. You see, the reason we went was to enjoy the walk to visit the UFO sighting that took place in 1980. For those of you who don't know, the site was where several USAF personnel witnessed a craft of unknown origin. It's all fascinating stuff and a good read.

So, with my penchant for the mysterious, I decided to have a look at what apps are available for those of us who like to sit around a fire at night and discuss the great mysteries of the world with other like-minded individuals.

Ultimate Conspiracy

Not a bad app this one, as it takes broadcast information from such sites as the GLP, Conspiracy Archive, Above Top Secret and Infowars and presents them in a more readable format, saving you from poring over many sites at once to get the latest news.

To be honest, I've stopped visiting many of these sites since they seem to be filled with false information and shills, but they still enjoy a healthy membership – even the David Icke pages, which it also gathers information from.

Nexus Magazine

An e-edition, bi-monthly alternative news magazine available as an Android app, Nexus Magazine covers a wide range of information for the open-minded.

You'll find everything here, from the latest health and science breakthroughs, suppressed news and ancient mysteries to the latest UFO sightings and governmental cover-ups.

The app is a payment subscription gateway to the actual paper version, but if you're looking for some alternative news, then this is one to check out.

Conspiracy Theory X

If the Ultimate Conspiracy app isn't for you, then take a look at Conspiracy Theory X. This is another app that collects the latest feeds from a number of sites and forums and presents them in audio, readable or video form, depending on what the news item is.

There's a lot covered here, and it's not all about little green men or Scandinavian aliens. It covers alternative health news, like hacks and the latest alternative technology news.

The Toronto Protocol

According to legend, a shadowy cabal of powerful people met in Canada throughout the 60s and 80s to discuss something quite explosive. Allegedly, they were in the process of setting up a global government with designs to control all of humanity through the media, entertainment and other forms of suggestive information. The New World Order, as it came to be known as, makes for some interesting reading, and this is the English translation from the journalist Serge Monast before his death. Well, it's a somewhat watered down and edited version, but it's still a good read.

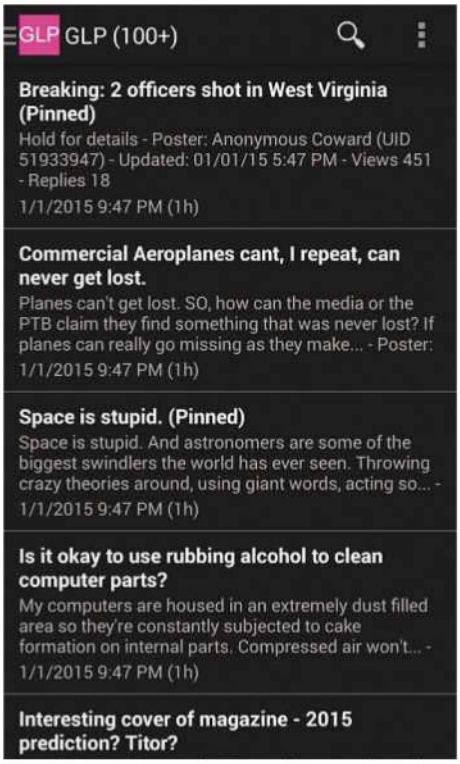
The Truth Is… Probably A Lot Less Interesting

So there are a few ideas to look up, to keep you informed or entertained on the old commute into work.

What we'd like to see is an interactive map of local legends, mysteries, sightings and theories, but alas there doesn't seem to be anything of this sort available at present. Perhaps if you clever developers out there are interested… **mm**

Features At A Glance

- Alternative thinking and news items at a glance.
- Other information about technology and health available.
- Free apps.



You can keep up to date with the latest alternative news items

There are also alternative technology health items to look up, as well as UFO sightings and so on

Logging Off

I've you've a PC problem and you're in Colorado Spring, I'd strongly recommend you don't ask local herbalist Lucas Hinch for technical support. He was recently a citation for discharging a weapon in public by local law enforcement, after he decided to repurpose his Dell PC with a 9mm pistol that he bought on Craigslist. After an especially fraught session that ended in a bluescreen, Hinch took the errant computer outside into the alley behind his homeopathic herb shop and terminated its long-term service contract with extreme prejudice.

From what pictures I've seen, given that he was just 8ft away Hinch's grouping is rather poor, and the Dell was an ancient model that was probably running XP when it was bought (and bought it).

However, with a muzzle velocity of over a 1,000 feet per second for a 9mm round, even Lucas's marksmanship was good enough to do for the Dell, and the attending officer, Lt. Jeff Strossner, confirmed that it died at the scene before medical assistance could be rendered. In a tweet, he would later describe Hinch's actions as an 'execution', though not gang or mob related.

Once an autopsy has been performed, a private ceremony is planned, possibly at a local recycling facility.

When questioned, the perpetrator detailed a long running and difficult relationship with the deceased that ultimately lead to the pre-meditated attack. In his defence he pleaded ignorance that firing guns in public within the Metro city limits of Colorado Springs was an offense. Who knew?

Depending on how the judge who heard this case views his actions, he's either looking at a fine, and/or community service. Whereas, if he'd done the same thing in the UK he'd be facing a long prison sentence for an unregistered and unlicensed firearm, reckless endangerment of the public, terrorist activities and possibly, fly-tipping.

The fine irony of all this must be that had he taken the money he paid for the gun and that he'll be paying in a fine and invested in a newer PC we'd not be talking about him. And he'd probably not be getting so angry that even one of his highly recommended herbal remedies couldn't calm him down.

Of course, he's not the first person to seek retribution on inanimate objects or computers. We've all been there when, for whatever reason, a system throws its digital dolly out of the

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pram just as you click the 'document save' button.

If this happens to you, it's worth remembering that compared with systems of old, the ones we have today are significantly more robust, even the ones still on XP!

Anyone old enough to remember Windows 3.0, Gem 1.0 or even IBM OS/2 1.0 will have an entirely different definition of the term 'unstable'.

Windows could crash just using the wrong combination of accessory tools, and not a single day went by without a complete freeze or cascade of exception errors. These days we expect things to work much better than that, and for the most part they do.

My long distance assessment of Lucas Hinch's Dell, based on statements he made to Lt. Jeff Strossner, is that it was probably overheating. With the extra ventilation provided by the bullet holes it might work better now, had the projectiles not subsequently impacted the motherboard.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: **1** Iffy, **3** Tripodal, **9** Formula, **10** Range, **11** Reith Lecture, **13** Arcana, **15** Actium, **17** Heliocentric, **20** China, **21** Licence, **22** Symmetry, **23** Mods.
Down: **1** Informal, **2** Fermi, **4** Reaper, **5** Pyrotechnics, **6** Denarii, **7** Lieu, **8** Authenticate, **12** Smackers, **14** Caesium, **16** Scalar, **18** Rondo, **19** Acts.

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Sometimes it really is the little things that can make a difference; like a tweet, maybe? Or the news that all of a sudden it's possible to embed some of our favourite games of yesteryear within a tweet. Indeed, if you're reading this, it probably means that there's been some sort of intervention to pull John away from Sim City for long enough to bother to get the ads sent to printers. We obviously assuming you are reading this, or otherwise we wouldn't bother and just stop typing right now... Just don't tell any of the other staff that Speedball 2 is out there, in the wild, in a tweet, that they can send to each other.

Another tweet-related topic of discussion this week has been the difficulty of controlling or mediating in spats across the social network. The conciliatory Haiku skills required for diplomacy are very rare things indeed - though we have several friends who will tell you that no arguments *ever* get solved via electronic communications, rather people just get bored of them and move on. We guess that's kind of correct, as it's so hard to infer nuance and meaning without hearing a voice or seeing a face that it's almost inevitable that misinterpretations occur.

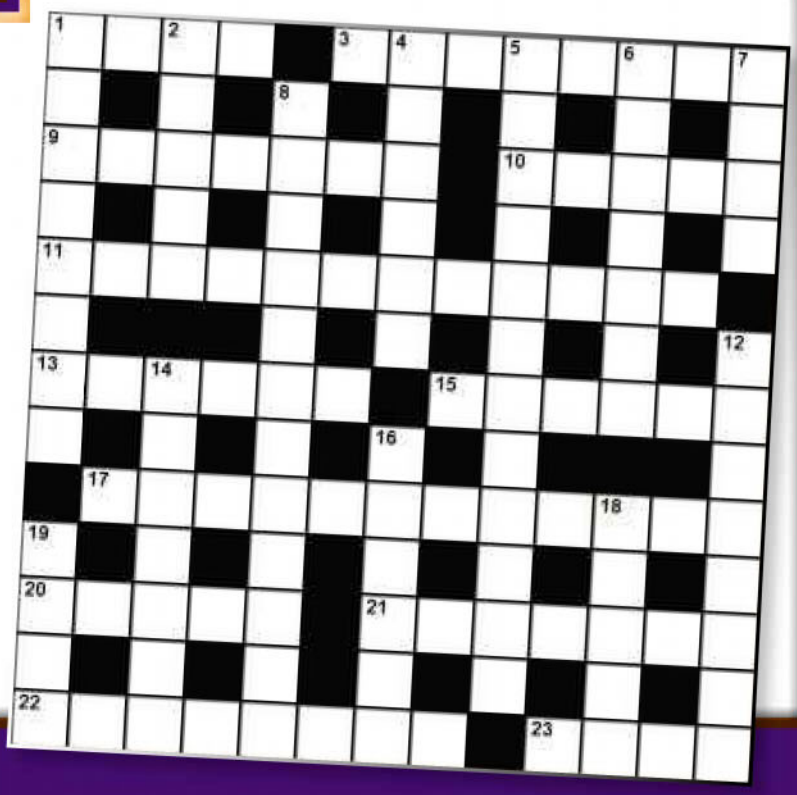
THIS WEEK'S CROSSWORD

Across

1 The product of a number multiplied by its square. (4)
3 A Japanese company that markets storage media and flash memory products. It is a subsidiary of Mitsubishi Chemical Holdings. (8)
9 IE F5. (7)
10 A Microsoft typography-based design language. (5)
11 Any polyhedron having twelve plane faces. (12)
13 Intrude or interfere in other people's affairs. (6)
15 The assembler language for the 1960's UNIVAC 1107 36 bit computer. (6)
17 A modern theory that explains new species in terms of genetic mutations. (3-9)
20 Adds "multiheading" support to Windows (the ability to run multiple instances of the graphics subsystem). (5)
21 Of or containing water. (7)
22 A JavaScript image gallery framework that simplifies the process of creating image galleries for the web and mobile devices. (8)
23 Affirmative voters in a UK Parliamentary division. (4)

Down

1 The recorded state of the working memory of a computer program at a specific time, generally when the program has crashed. (4,4)
2 Something that is split or cleft into two parts. (5)
4 Ancient Hebrew dry measures equivalent to baths. (1 bath is about 40 litres) (6)
5 Also known as a boot sector infector, it infects both boot records and files on the computer system. (7,5)
6 A thermionic valve having four electrodes. (7)
7 The second-brightest regularly visible celestial object in Earth's sky (4)
8 Born in 1883 this noted Dublin accountant designed an Analytical Engine that used multiplication as its base mechanism unlike Babbage's which used addition. (5,7)
12 Health professionals trained in the art of preparing and dispensing drugs. (8)
14 A small four-sided spinning top with a Hebrew letter on each side, used in Jewish gambling games, especially at Hanukkah. (7)
16 High end Italian fashion house founded in 1975. (6)
18 The expression of one's meaning by using language that normally signifies the opposite, typically for humorous or emphatic effect. (5)



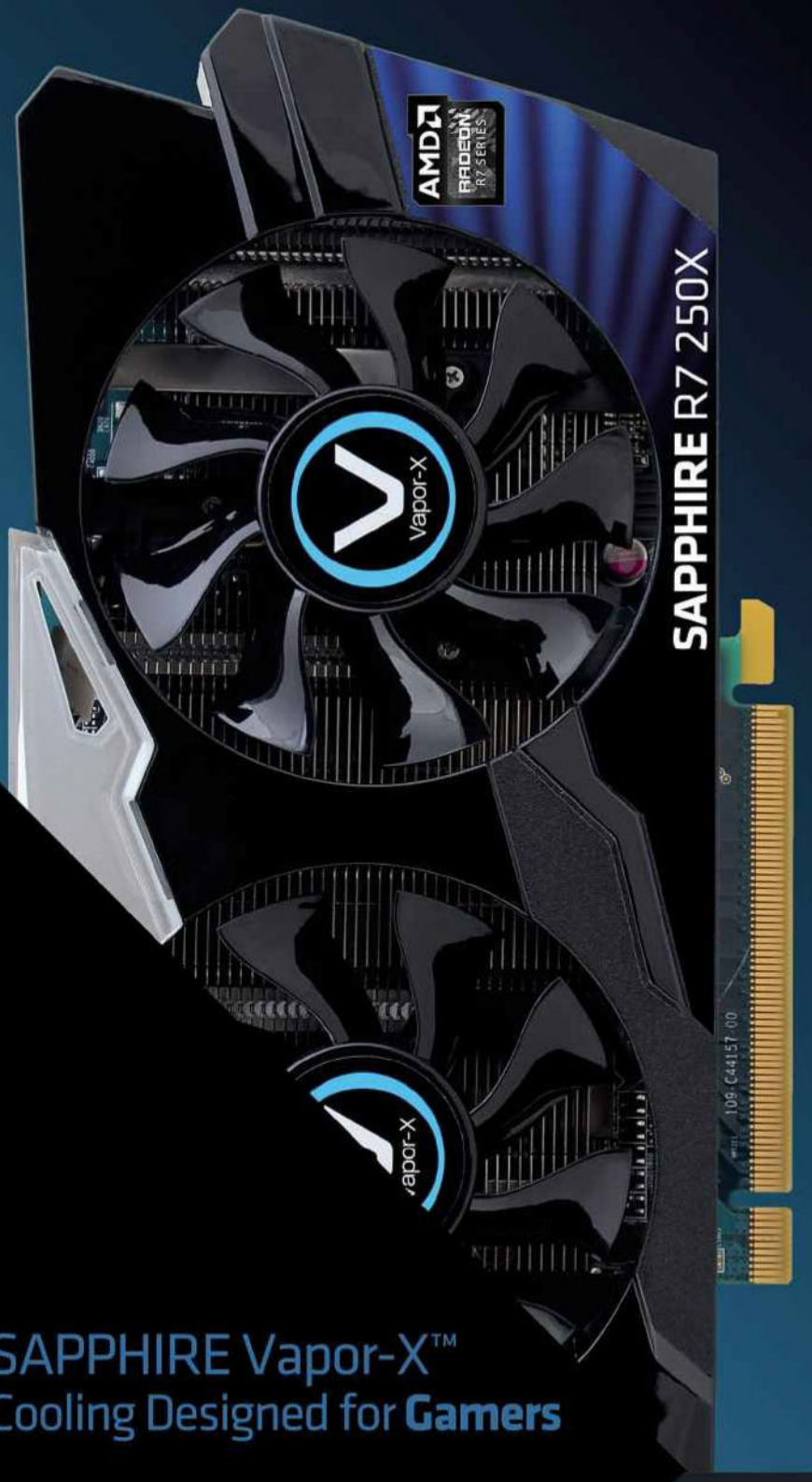
In Next Week's Micro Mart*

- 3D printing special!
- Self-built printers versus consumer units
- How 3D printing works
- Where to get the best 3D designs
- Plus the usual mix of news, reviews and advice

* May be subject to change

Gaming Starts Here

Vapor-X



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